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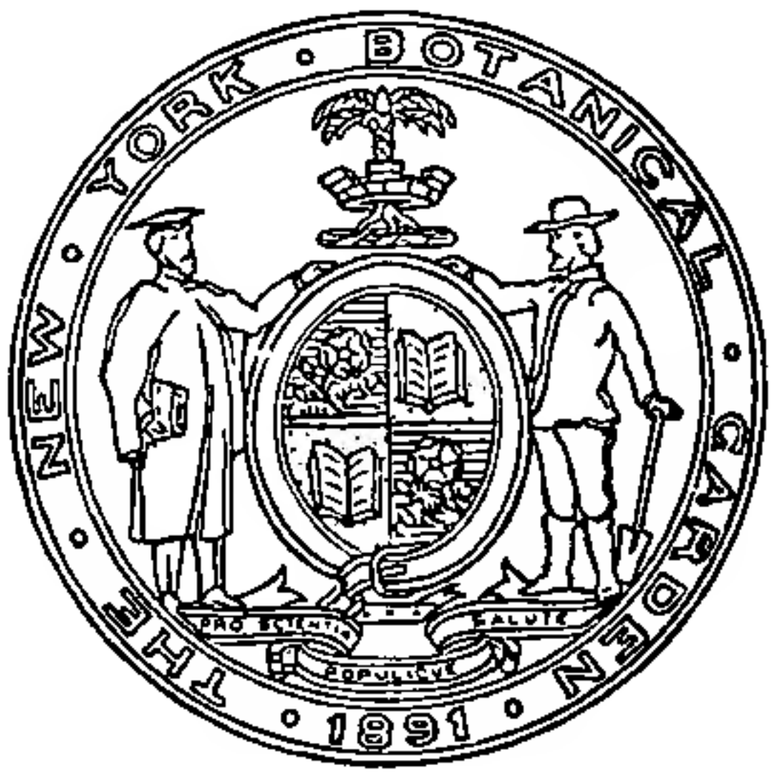
OF
THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD
EDITOR



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Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

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Memoirs of The New York Botanical Garden. A collection of scientific papers. Volumes I-VII. Titles on request.

Direct all orders to The New York Botanical Garden, Bronx Park, New York, N. Y

* * *

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The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

MEMBERSHIP IN THE GARDEN

Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

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Fellowship Member	annual fee	100
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All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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JANUARY, 1938

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EXPLORATION AND HORTICULTURE

The large-flowered rock-garden plant, *Oenothera argillicola,* which appears among the photographs on pages 12 and 13, is one of the many subjects brought back from expeditions which are now thriving in their new environment.

Discovered near White Sulphur Springs, West Virginia, by Kenneth K. Mackenzie in August, 1903, and named by him the following year, it was thereupon cultivated by one or two interested people, but was later lost from their gardens. Since its re-introduction after the Southern Appalachian expedition of 1933, this evening-primrose relative has been flowering successfully in the Thompson Memorial Rock Garden. Accompanying it in the garden are numerous other plants also either new or revived in cultivation, which give promise of wide adoption in the near future.

Already a few of the plants brought back from the Garden's Rocky Mountain expedition of 1936 have flowered in their permanent new homes in the rock garden. Others, still in coldframes and nursery rows, are slated for use in the annual border or in groups of shrubbery—all of them plants which will add a new distinctiveness to American horticulture.

It is not only from organized expeditions that novelties are acquired. Staff members, on their vacations or on private collecting trips, habitually bring back plants which prove horticulturally valuable. Collaborators of the Botanical Garden, whose main interest is to increase the herbarium collections, frequently send to New York seeds of interesting new subjects and sometimes they send living plants. The succulent collection, especially, has been greatly increased through the work of one of the collaborators.

Thus are several functions of the Botanical Garden combined with a resulting enrichment of horticulture.

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Cultural Notes On Hardy Deciduous Azaleas

By Clement G. Bowers

PEOPLE are finding it comparatively easy to grow azaleas in New York, New Jersey, New England and elsewhere.

I do not mean all azaleas, all people, or all places. However, a goodly number of these lovely shrubs have shown themselves to be satisfactory dooryard and garden plants, succeeding with little more attention than careful planting and the observance of a few fundamental requirements.

It would be untrue to say that all azalea growers are in agreement concerning the details of culture, for even the most scientific workers do not yet know enough about azaleas to be dogmatic in regard to such things, and it is very evident, further, that methods may vary with soils and climates. But within recent years we have learned certain significant facts concerning the physiology and the cultural needs of azaleas and their kin—such things, for instance, as their specificity for acid soils, abhorrence of drought, tolerance of shade, preference for a cool soil, and similar ecological facts. We have also learned something about fertilizers, beneficial and harmful, and our knowledge of azalea nutrition is growing. Yet there is so much more to be learned in a practical way that, without understanding why, the man from Buffalo complains that he is unable to keep azaleas at all, while the man from nearby Rochester grows them successfully in peat, and the Long Island man may be doing little or nothing to the natural soil and yet be able to raise fine azaleas. I shall not hazard a conjecture as to

why these and other inequalities exist, except to say that certain obscure or infinitesimal factors in soil, water, or biological relations, not yet isolated, may be operative here as in numerous other plants.

One rule to follow that is always safe is this: Do not take too seriously the notions of various growers, good as these may be in their respective localities, but copy the methods of the people in your own neighborhood who seem to be the most successful. Meanwhile, do a little experimenting on your own account. Local conditions are often very significant, especially in the vicinity of New York City where several species reach their northern limit of hardiness and a very irregular sort of Mason-Dixon line seems to be drawn, beyond which one cannot grow certain plants.

It may be well to start with the site and soil. Although often woodland plants, azaleas generally bloom more abundantly when grown in a well lighted situation, with a fair amount of sunshine, than when grown in the shade. Hot dry sites, however, such as south slopes, dry walls, and dry windswept areas, should be carefully avoided. Perhaps the very best location for most azaleas is a site where the sun will fall on the plants about half the time. They grow more luxuriantly and bloom better in such a situation than if growing in complete shade or in the woodland, although they are tolerant of shade and may be used in spots too shady for ordinary shrubs. While winter winds are most disastrous to the evergreen rhododendrons, the warm dry winds of summer are more destructive to the deciduous azaleas, which are in the same large genus. Such winds injure the plants directly by accelerating their water loss and they leave an even more disastrous aftereffect by checking the plant's summer growth and thus predisposing it to winter injury later on.

As noted in a previous paper* a uniform moisture supply during the summer appears to be prerequisite for vigorous growth and subsequent winter hardiness in the deciduous azaleas and their hybrids, such as the Ghent and Mollis types. Conversely, an interrupted supply of water, occasioned by dry spells and warm temperatures, causes azaleas to be checked in growth and, as a consequence, makes them more susceptible to winter-killing. In my trials, a heavy mulch of oak leaves, maintained throughout the summer, proved far superior to the garden hose in providing

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* Journ. N. Y. Bot. Gard. **38**: 73-78, 1937.

uniformly good soil conditions for azaleas. This was reflected in better growth of the plants which were mulched.

Although peat may not be needed for all azalea soils, and some growers prefer not to use it, I feel that it is needed for my plants. The kind which comes in bales from Holland, Scandinavia, and elsewhere or that which comes from domestic sphagnum beds is suitable if acid in reaction (which is its usual condition), and it remains longer in the soil than the finer Michigan sedge peat which, on the other hand, is preferred for propagation of some kinds. I make "peat beds" for my azaleas, going to a depth of 18 inches with a mixture of peat and garden loam in equal parts. For good results, the soil underneath should be light and well drained—a sandy or gravelly subsoil is excellent—although any well drained site may be used. Waterlogged soils and very heavy clays should always be avoided despite what people may say about azaleas growing wild in swamps. Abundant organic matter in the soil is beneficial when it is not alkaline.

As a substitute for peat, oak leaf-mold, natural woodland topsoil or the so-called "upland peat" may be used in the soil mixture. This material not only furnishes needed acidity to an ordinary garden soil without the use of acidifying chemicals (a soil testing pH 4.5 is optimum), but its physical nature furnishes aeration, permeability, and water retentive qualities to the soil, thereby making a suitable environment for the delicate and shallow azalea roots. Peat combined with a mulch of oak leaves assures ample aeration, uniform moisture and some plant food from the slowly decaying leaves. Another advantage of peat is that few weeds enter a peat bed and that, if they do become established there, such pests as quackgrass may be easily pulled out entire. If a bed is not made, individual plants may be set in a similar peaty soil mixture, but, in alkaline regions especially, there is some advantage in grouping the acid-loving plants into good-sized beds.

If fertilizers are desired, be sure to use only those that are recommended for rhododendrons, blueberries, or similar ericaceous plants, and avoid the usual garden fertilizers which ordinarily contain nitrate of soda or other substances injurious to these plants. Ammonium sulphate, in dilute applications, or tankage or decayed manure which is old enough to have lost the main strength of its alkalinity are suitable forms of nitrogen if judiciously used.

Other formulae are available. Most fertilizers should be applied in early spring and not later than the first of June. Lime or other alkaline substances should be avoided.

When properly handled, azaleas may be planted in either spring or fall, and a good azalea grower can transplant them at other times, including the time when they are in full bloom. As a rule, it may be stated that from April through early May is the most desirable time in which to transplant azaleas in the northeastern United States. After choosing the site, prepare a peat bed as mentioned above or, if preferred, set the plants in individual positions. When planted individually, dig each hole twice the size of the root-ball and fill this hole with the mixture of peat and soil. Set the plant in this mixture. Do not bury it, but try to keep it at the same depth as it was formerly growing, since azaleas are shallow rooters. Plants should always be moved with a firm, undisturbed ball of roots bound in burlap. It is a good practice to put a gallon or two of water in the bottom of each hole before planting. After the plant is firmly set, place a layer of oak leaves on the surface of the soil to act as a mulch and allow this to remain over the roots of the plant, or on the surface of the bed, all summer. A six-inch layer of oak leaves is recommended. This mulch should be allowed to remain constantly, winter and summer alike, being replenished with a layer of new oak leaves every autumn. While other materials may be used for mulching, oak leaves are preferable, since leaves of maple, elm, or other thin or rapidly-decaying materials soon disintegrate and become alkaline, while oak leaves retain their acidity and their fibrous character for a long time. If, after long standing, the leaves become too tightly packed, they should be loosened up and shaken out. Peat makes a good mulch, but should be surfaced out with leaves, since it becomes very dry on top if unprotected and tends to shed water rather than to absorb it. If a mulch appears unkempt or the leaves blow off, the bed may be edged with low shrubs such as dwarf azaleas, *Vaccinium pennsylvanicum*, *Juniperus horizontalis* or numerous other low woody materials, which will screen the mulch from view and keep the leaves from blowing away. In many situations a mulch is not unsightly and such treatment is unnecessary.

There are other ways of handling azaleas than those described here, but I feel that the system of a peaty soil combined with a

constant mulch, over a porous subsoil, gives azaleas better growing conditions than ordinarily obtainable outdoors under artificial irrigation or other garden expedients. This is especially true where the water is "hard" or alkaline, since such water is injurious to the plants and will soon destroy the acidity of the soil. Where a mulch is used, rain water is conserved, loss is prevented and there is little need of artificial irrigation even in times of drought. Besides this, it has been truthfully said that azaleas and rhododendrons like to have their "feet" cool. During the warm dry days of midsummer, the peaty soil underneath the mulch will remain cool and slightly moist at all times. In winter, also, the mulch protects the soil from alternate freezing and thawing, with resulting benefit to the azalea plants.

These, then, are some of the fundamental factors concerned in the culture of hardy deciduous azaleas. More specifically, let us say that these directions are intended especially for those species which may be called the native azaleas of America, also for their allies, the five-anther azaleas of Japan and China, *Rhododendron japonicum* and *R. molle,* and for their various hybrids, including the extensive races of hybrids called Ghent and Mollis azaleas. The statements made here and the directions given can probably be applied also to other hardy or semi-hardy azaleas, such as *R. Kaempferi* and the various Japanese species and varieties of the Obtusum subseries, but there is some evidence that the members of this Obtusum group are not so definitely in need of the peaty soil and summer mulch as are the azaleas of the Luteum subseries (which are also called the Pentanthera azaleas), comprising those which are mainly discussed here. On Long Island, for instance, the members of the Obtusum group are perhaps more commonly grown than are the native azaleas and are possibly a bit less sensitive to summer dryness. There is every reason to encourage the greater use of the native species, however, and also such other kinds as *R. japonicum* and the beautiful races of hybrids, since they offer a whole new list of garden possibilities. What these possibilities are, and what species may be recommended as the best, I shall try to describe later.

In the meantime, let us observe that many of these beautiful shrubs, now sparingly or indifferently grown, may be successfully handled in this region, and that, when properly planted, they will require little more care than the annual replenishing of the mulch and the removal of faded flowers from the plants after blooming.

A SOUVENIR OF 1937

When Amorphophallus titanum was just coming into bloom at The New York Botanical Garden last year, Dr. Hans Schäfer of Lebong Tandai, Sumatra, en route to his former home in Görlitz, Germany, came to the Bronx especially to see the great inflorescence. He was already familiar with this giant of the plant world in its native habitat and with other species of Amorphophallus, and also he had witnessed the flowering of one of Hamburg's specimens. As a souvenir of his visit he presented the Garden with this photograph of Amorphophallus Brooksii, taken by himself at Lebong Tandai on January 12, 1936. The plant, he said, had grown to its mature height of 3.50 meters (11½ feet) in 28 days.

Annual Report of the Acting Director For 1937

By H. A. Gleason

The summary of the year's activities, which follows, was presented at the annual meeting January 10 before the Board of Managers and Members of the Corporation.

Finances

As in previous years, the Garden has been operated along lines of strictest economy, and closes the year with a handsome unexpended balance to its credit. It must be emphasized, however, that most of this balance is due to the payment of cumulative dividends on United States Steel Preferred and to certain extra payments by the City of New York. The former have been fully paid and will not be a source of unexpected revenue in 1938, while there is neither assurance nor expectation that further additional payments will be received from the City. The Acting Director seriously recommends that no new obligations be incurred and no new activities initiated, except on the basis of new sources of income.

Almost every member of our personnel suffered a reduction in salary in 1932, due chiefly to decreased appropriations by the City, and at the same time certain positions were abolished. These positions have now been restored, certain new positions have been established, and certain salaries have been increased. All the new positions are connected with maintenance or with gardening, and have enabled us to function with considerably more efficiency than before.

Buildings and Grounds

Our employees have continued to maintain our buildings and mechanical equipment in a reasonable state of repair. It must be noted, nevertheless, that many repairs are still greatly needed, especially in the Museum Building and Conservatory Range 2. Some of these have been included in our request to the City for appropriations under the Capital Outlay Budget.

In the Museum Building, weather stripping has been attached

to all basement windows, temporary repairs made to the roof over the library, a skylight replaced, a new pair of outside doors built, parts of the heating system renewed, a new hot water heater installed, and many minor repairs made.

Two additional expansion joints were installed in the steam line supplying the Museum Building, to replace the unsatisfactory ones used in the original construction.

Contracts for the rebuilding of Conservatory Range 1, under a City appropriation of $350,000, were let partly to Lord and Burnham Co. and partly to the Metropolitan Greenhouse Company. Work began in the spring, is still in progress, and will not be completed until some time in 1938. At the present time it is estimated that houses 4 to 10, inclusive, are 98 per cent complete and some of them have already been re-occupied by us. Houses 1, 11, and 12 are 30 to 80 per cent complete, while houses 13, 14, and 15 have not yet been started. In general, the repairs consist in replacing all defective steel and in substituting steel U-bars for the old wooden bars in the roof. Old steel work has been thoroughly painted; new glass has been used throughout, electricity is being installed, and numerous minor improvements are being made. In connection with this work our own employees have replaced the steam coils in houses 2, 3, 5, 14, and 15, made extensive repairs to the heating system in other houses, and made various other minor improvements.

A new water line has been laid to the Thompson Memorial Rock Garden to increase the pressure available there. Four drinking fountains on the grounds were renewed. New drains were installed in the Rose Garden, using about 1,850 feet of tile. Other repairs to the plumbing and sewer systems were made as necessary.

The Works Progress Administration has completed the resurfacing of footpaths west of the Bronx River and has made some progress on the east side of our grounds. The Works Progress Administration also provided most of the labor for sinking the path along the Advisory Council Garden and installing the necessary curbing.

Horticultural Operations

From the viewpoint of the visitor to our institution, the year just closed comprises two distinct periods, the first a period of extraordinary success, and the second one of general turmoil. The

One of the newly resurfaced paths in the Hemlock Forest, completed during the past year with the aid of the Works Progress Administration.

former was due to wise superintendence and efficient personnel; the latter was caused entirely by the reconstruction under way at Conservatory Range 1, which necessitated the closing of the Range and suspension of certain activities until after the completion of the building.

A notable success of the past winter was the continuous display of flowers and other ornamental plants in Range 1. Houses 5 and 6 were used for this purpose and a magnificent display was maintained for seven months. During this time more than 20,000 pots were used, representing 782 species and varieties. The special Christmas display consisted of 1,811 plants in 194 varieties, and at Easter 5,028 plants were shown, representing 308 species and varieties. The public response to these displays was most satisfactory and the number of visitors to our greenhouses was greatest in the history of the Garden. On fine Sundays attendances of five thousand or more were by no means unusual and at least twenty thousand people saw our Easter display. In spite of inclement weather on Easter Sunday, a solid mass of humanity passed through the houses until long after the regular closing hours and an accurate count showed 6,717 visitors in four hours.

Due to the extensive reconstruction work at Range 1 no display was planned for the present season and our efforts have been concerned primarily with the preservation of valuable collection material. This has involved a great deal of moving of plants from house to house, including the temporary transfer of many plants to Range 2 or the Propagating House. In this process very few plants have been lost and of most of these we have living duplicates.

A noteworthy occurrence in June was the flowering of the giant Krubi, *Amorphophallus titanum*, for the first time in America. This event received remarkably wide publicity. Newspapers and magazines throughout America, and some also in foreign lands, described and illustrated it; it was shown in news reels in hundreds of theaters; it was shown by models in shop windows, and for a fortnight or more it was literally the talk of the town. The August number of our Journal was entirely devoted to an account of the plant.

In Conservatory Range 2 the permanent collections are in satisfactory condition. The orchid collection has been improved by many additional species and shows a general improvement in

health. The installation of suitable benches would insure still further improvement in the condition of the plants. The begonia collection now ranks as the finest in eastern America. The collection of tender bulbous plants has been increased by some forty species and is now thoroughly representative of the group.

No appreciable expansion of the outdoor flower gardens has been undertaken, but a satisfactorily high standard of cultivation has been maintained.

The annual borders were planted with more than 30,000 plants and were exceptionally fine throughout the season. Because of anticipated alienation of the site of the dahlia beds, the dahlias were temporarily planted in a part of the annual borders, using 650 plants in 285 varieties. The plantings of hardy chrysanthemums, hardy asters, cannas, and irises have been maintained as usual.

In the Advisory Council border, the background has been improved by planting 19 large cedars. A quarter of the border has been lifted, double-dug, and replanted, following our four-year rotation. A hedge of yew has been planted along the curb opposite the border. There has been a continuity of bloom throughout the season and the border has been very popular with visitors.

In the Rose Garden, 1,500 hybrid tea roses were replaced and the entire garden re-labeled. Careful attention was given to fertilizing, cultivation, and disease control, and the display of roses was continuous from June to November, attracting many visitors. An adequate system of drains was installed in November, considerably lowering the water-table. We confidently expect that it will reduce the winter-killing which has been so prevalent in the past.

The Thompson Memorial Rock Garden is very definitely one of the most satisfactory of our outdoor gardening features. The plantings in the older parts of it are now thoroughly established and much additional planting has been accomplished during the year. The north end has been planted with 8,000 Ericas and Callunas in variety. Large numbers of plants of Pachysandra and Arctostaphylos have been established on the west slope and more than a hundred laurels have been planted in the woodland background. Construction work has been finished on the large moraine and the bog garden. The development of a wild flower area in the southern portion has been well started and about a hundred

A new sunken path from which to enjoy the perennial border of the Advisory Council

REPRESENTATIVE ACTIVITIES OF 1937 AT THE BOTANICAL GARDEN

Retaining walls built around the bases of trees

Immediate burning of an elm afflicted

Controlled breeding of Hemerocallis

Five periodicals published

Oenothera argillicola, represe
ing exploration and horticult

The herbarium, largest under one management in America, host to many botanists engaged in taxonomic research

native species have been planted. In May a special Rock Garden week was designated and the garden was freely advertised, resulting in a large number of visitors.

The work accomplished with trees and shrubs has been much greater than in any recent year. In our permanent collections 932 trees and shrubs were set out, representing 232 species and varieties; 541 others have been planted or transplanted as a part of our decorative features; 1,125 rhododendrons and laurels have been used in the establishment of a rhododendron glade, 2,462 shrubs or small trees have been removed from the northern end of our grounds to a temporary nursery, and 400 more young hemlocks were established in the hemlock forest. Large amounts of thinning and pruning have been done. The entire collection of conifers and many deciduous trees have been re-labeled.

In our regular seed exchange, 5,410 packets were distributed to botanical gardens and similar institutions in all parts of the world, and we received 1,786 packets in exchange.

The members of the Garden will be interested to know that more than 2,200 kinds of plants are now growing in our rock garden, and that our collection of cacti and other succulents includes more than 2,500 species, many of them of great rarity.

Insect Pests and Fungous Diseases

One new case of Dutch elm-disease was found on our grounds and the tree destroyed. Several other elms with dead limbs were also either thoroughly pruned or destroyed. The elm leaf beetle was kept under control by spraying, except on the tops of the taller trees which our sprayer is unable to reach.

The gypsy moth has not been noted on our grounds at any time during the year.

The Japanese beetle continues to be a serious menace to our gardening operations. During the year about 3½ acres of lawn have been treated with arsenate of lead. About 450,000 beetles were caught in traps and about 75,000 hand-picked, the latter mostly from the rose garden, where spraying during the blooming season is not advisable. Evidence has been found that the larvae of this beetle are responsible for spreading the soft rot of iris. Our iris beds were accordingly treated with arsenate and both the beetle and the soft rot kept under control.

For the first time in the experience of our pathologist, the white fly, a common greenhouse pest, appeared in epidemic form on outdoor plantings of verbena.

In general, a continuous program of spraying has been maintained in our greenhouses and plantations, and as a result we have been remarkably free from pests and diseases.

Herbarium

Throughout the entire history of the Garden, the development of the herbarium has been favored and the prosecution of research based upon it has been emphasized. As a result of both, the Garden possesses one of the really important herbaria of the world, rich in types, rich in historic material, and illustrative in a comprehensive way of the flora of both Americas and of southeastern Asia. As a result of continued residence of eminent taxonomists at the Garden, it also enjoys a remarkably high reputation as a taxonomic center.

The growth and utilization of the herbarium has continued during 1937 at

its usual tempo. The total additions amount to 41,314, of which 2,442 are algae, 283 hepaticas, 3,145 fungi, 367 lichens, 801 mosses, and 34,276 flowering plants. As a result, the herbarium is now estimated to contain 1,887,889 specimens, making it the largest herbarium in America under single management. In flowering plants it is second only to the National Herbarium at Washington; in fungi it is exceeded only by the Department of Agriculture at Washington and the Farlow Herbarium at Harvard; in mosses it is probably the largest in the world.

The growth of the herbarium is not restricted to specimens only. Thousands of types or printed descriptions of plants have been mounted with the specimens, thereby, to use the happy expression of Dr. Merrill, "bringing the library into the herbarium" and saving enormous amounts of time and labor for students. Numerous photographs of important specimens, more than a thousand drawings of hepaticae, and more than three thousand permanent preparations of minute plants for microscopic study have also been incorporated.

Thousands of specimens have been repaired, or remounted, or freshly treated with poison, and the whole herbarium is in better than average condition.

There would be no purpose in developing a collection of such size if it were not used for scientific study. During the past year our herbarium has furnished the material for continued research by Curators Small and Seaver, Associate Curators Wilson, Smith, and Moldenke, and Assistant Curators Alexander and Camp. Thirty-one botanists from other institutions have spent from two days to two months with us in the prosecution of their own research. No less than 16,562 specimens have been sent out on loan to non-resident botanists to assist them in research in their own institutions, while slightly more than 6,000 specimens have been borrowed by us.

The funds available to the herbarium are by no means sufficient to purchase the specimens which were added, or to pay the expenses of our staff for collecting them. Approximately half have been received by exchange, a fifth by gift, a fifth by purchase, and the remainder mostly in return for the identifications of the specimens by our specialists. While we received about 17,000 specimens in exchange, we sent out in exchange more than 20,000, and we now have a credit balance of 66,000 specimens due us to balance our exchange relations.

Research and Exploration

It has always been the policy of The New York Botanical Garden to encourage research by qualified members of its staff. It has also been the policy of the present temporary administration to insist that every member of the staff assume some degree of responsibility for the maintenance of the institution. No employee devotes his entire time to research, but an effort has been made to increase the time available for research to those persons who are most skilled and most productive.

(A) *Herbarium*

The Acting Director has been unable to devote any time to research during the year.

Dr. John K. Small, Chief Research Associate, has been greatly handicapped by illness during a considerable part of the year. He has continued to collate his great store of information, acquired during nearly forty years of service at the Garden, into useful manuals for the general botanical public. Among these may be mentioned a series of handbooks on ferns, each dealing with one section of the United States, and a large general flora of the southwestern states.

Dr. Fred J. Seaver, curator, has continued his studies on the cup fungi, which when finished will be published in *North American Flora.*

Dr. A. C. Smith, associate curator, completed during the year an elaborate study of the American nutmegs, which comprise many large and important trees of the tropics. This work will be published in the next issue of *Brittonia,* now in press. In conjunction with Mr. Boris A. Krukoff, Dr. Smith also completed and published a study of the various species of plants which produce rotenone. This valuable insecticide has only recently become commercially important, and exact information about its sources was greatly needed. With the permission of this Board, and with further financial support from the Arnold Arboretum, Dr. Smith left for South America in August, as a member of the Terry-Holden Expedition. He is now located in botanically unexplored country, near the southern border of British Guiana.

Dr. H. N. Moldenke, associate curator, completed his manuscript on the Pipewort family for *North American Flora,* and this has been published. The remainder of his research time has been devoted to a continuation of his taxonomic work on the Verbena family, for which Dr. Moldenke is recognized as the outstanding authority. His work is being prepared with a view to publication in *North American Flora,* so far as it pertains to North American species, in the monumental *Flora of Brazil,* and in the *Flora of Surinam,* as well as in a series of more detailed monographs.

Mr. E. J. Alexander, assistant curator, devoted the small part of his time which is available for research to the preparation of manuscript for *North American Flora.* He completed his work on the Pickerel-weed family, which has since been published, and his manuscript on eleven genera related to the Dahlia is now in the hands of the editors.

Dr. W. H. Camp, assistant curator, has continued his studies on the North American representatives of the Heath family, especially the blueberries and their relatives, in preparation for publication on this important family in our *North American Flora.* He has also finished an extensive study on the structure of the flowers in the castor bean, which will shortly be ready for publication, while a detailed taxonomic study of the small but interesting genus *Leiophyllum* is now in press. Dr. Camp spent the first three months of the year in field work in southern Mexico, almost entirely at his own expense. His chief objective was field study of the Mexican species of blueberries, but he also brought back about 4,000 herbarium specimens as well as various seeds and living plants.

Mr. Robert Hagelstein, honorary curator, has continued his important studies of the slime-molds and is rapidly making our collection of these beautiful little plants the largest and most valuable in the country.

(B) *Laboratory and Experimental Work*

Dr. A. B. Stout, director of the laboratories, assisted by Miss Clyde Chandler, technical assistant, has carried on various lines of experimental work relating, in a general way, to the phenomena of heredity. Most important among these are his studies of the daylily and his improvement of hardy seedless grapes. His studies of heredity and incompatibilities in the daylily have already led, as is well known, to the development of many new varieties of horticultural importance, and have contributed greatly to the popularization of this plant in gardens. From an economic standpoint, this work is overshadowed by his less spectacular work in the development of hardy seedless grapes for eastern and northern cultivation. He has already produced about 175 varieties, which are now being evaluated for their horticultural importance. It is not at all unlikely that the commercial value of Dr. Stout's work will exceed the entire cost of the Botanical Garden during the forty years of its history. Dr. Stout's former work in the improvement of poplars for pulpwood has now been included in a comprehensive project of tree-breeding organized by the United States Forest Service, under direct charge of Dr. E. J. Schreiner, formerly assistant to Dr. Stout at the Garden.

Dr. B. O. Dodge, plant pathologist, has prosecuted research on a number of fungous diseases which have appeared on cultivated plants at the Garden, especially on certain diseases of euphorbia, of fig and of cacti. The latter diseases are especially interesting and important. Our duty is to understand the life history of the disease in order that it may be more easily controlled in our greenhouses, but the agricultural and botanical institutions of Australia and South Africa are anxiously searching for diseases which may help them eradicate cacti from their agricultural land. Dr. Dodge has also continued his well known researches into the problems of heredity among fungi. A large display of some 70 enlarged photographs, illustrating this work, was exhibited at the Paris World's Fair by special invitation.

Photography

Photographic work, used for our lectures, for recording the results of research, and for the general records of the Garden, has occupied the time of Miss Griffith, staff photographer, and one assistant from the Works Progress Administration. During the year Miss Griffith has produced 120 enlargements, 895 original negatives, 4,360 prints, and 540 lantern slides, most of which were hand-colored.

The Garden has no apparatus for making motion pictures, nor any facilities for projecting them. Both are important desiderata, which should be purchased as soon as conditions permit. There is also occasional need of apparatus for color photography.

Library

The crowded condition of the library was brought to the attention of the Board at the last annual meeting. During the year no additional shelves have been built and no additional card space has been provided. Obviously the condition of the library is more congested today than a year ago.

Since the last report the library has been increased by the addition of 594 unbound books and pamphlets and by 850 bound volumes. The great majority of the latter represent the periodicals regularly received. They bring the total content of the library to 45,916 volumes, plus a large and unknown number of pamphlets. During the year 3,500 catalog cards have been prepared by the library staff and 8,528 cards have been purchased. Forty-five volumes have been rebound, and many books have been cleaned or had their leather bindings oiled through the assistance of a W.P.A. worker. The serial publications have been completely listed for publication in the next supplement to the Union List of Serials in the Libraries of the United States and Canada.

There appears to be an ever-increasing interest in the use of the library, so that the present facilities are often inadequate to accommodate the visitors. Provision of a modern magazine rack and more table space for visitors is greatly needed, in addition to more space for books and for catalog cards. Application has been made to the Department of the Budget for funds to construct a mezzanine floor in the present stackroom, which will, if granted, provide space for many thousands of volumes and relieve the use of space in the laboratory.

Publicity, Lectures, Membership, Education, Etc.

Thirty-six public lectures have been given on Saturday afternoons, chiefly by members of the staff, with an average attendance of 80. It is noteworthy that travelogs attract more than the average-sized audience, while horticultural and botanical subjects fall below the average.

Approximately 15,000 children, escorted by their teachers, have visited the buildings to inspect our collections. Representatives of the Board of Education state that this work would be further expanded if certain material facilities were available. In this work no call has been made for assistance by our staff.

Visits of high school students have fallen off, largely because of the closing of our greenhouses. There has been no material change in the visits of garden clubs or similar organizations.

While no accurate count of casual visitors has ever been possible, it is easy to see that their number continually increases. Each pleasant Sunday during the spring, summer, and fall attracts at least 20,000 visitors to our grounds, but only a small fraction of them visit the Museum Building.

The increased attendance is partly due to better transportation facilities, and partly to a growing desire of the people to visit parks and gardens, but also to increased effort on our part to advertise the attractions of the Botanical Garden to the public. This has been done by cards in the subway and elevated trains and by publicity in the daily press.

Fifteen permits were issued for picnic parties in our grounds.

The membership of the Garden again shows a slight decrease. During the year 83 members have been lost and only 81 new ones added, making a total membership on December 15 of 1,156. The total receipts from this source were $10,775.

Use of the library by visitors has increased considerably, and our bibliographer also reports an increased number of mail requests for bibliographic information.

The instruction of student gardeners continues to be successful. The history and plan of the work were described in a recent issue of our *Journal* and need not be repeated here, except the brief statement that the course comprises two years, with an optional extension in certain circumstances, and consists of 48 hours per week of practical work in our greenhouses and on our grounds, of 144 required lectures on botany and horticulture, with assigned reading and exam-

inations, of outside study of the local flora, of personal participation in the gardeners' forum, and of informal lectures on many features of the other lines of work carried on in the Garden. The young men attracted to the course are in almost every case active, alert, intelligent, ambitious, and desirous of profiting to the utmost by their opportunities. Those who have completed the course and gone into private employment have in every case been successful.

The exchange of a student gardener with the Royal Botanic Gardens at Kew has been continued, with advantage not only to the participants, but also to the resident gardeners with whom they come in contact.

Volume 38 of the *Journal* was issued during the year, with 303 pages. Volume 29 of *Mycologia* was published with 743 pages. Two parts of *Addisonia* appeared as usual, containing 16 colored plates. One part of *Brittonia* was issued, with 128 pages. In *North American Flora* four parts were published, containing 298 pages and 36 plates.

The special endowment fund of *Mycologia* has been increased by $500, and now amounts to $5,000.

Personnel

Only two important changes in personnel have been made during the year.

Miss Sarah H. Harlow, librarian for 25 years, retired November 1, 1937, and was succeeded by Miss Elizabeth C. Hall

Dr. Forman T. McLean, supervisor of public instruction since 1928, resigned in November, and was replaced by Dr. A. B. Stout, who has taken general supervision of educational work.

Personal Honors

Dr. William J. Robbins has been elected vice-president of the Botanical Society of America for 1938.

The acting director has served through 1937 as president of the American Society of Plant Taxonomists, on the editorial board of the Torrey Botanical Club, and as chairman of a committee of the National Research Council.

Dr. B. O. Dodge has served on the council of the New York Academy of Sciences, as an editor for the Torrey Botanical Club, as a member of the council of the Mycological Society of America, and as a member of the executive committee of the Third International Congress for Microbiology.

Dr. J. H. Barnhart has been editor for the New York Academy of Sciences and President of the Torrey Botanical Club.

Dr. H. N. Moldenke has been treasurer of the Torrey Botanical Club.

Dr. W. H. Camp participated by invitation in the symposium of the Botanical Society of America at its Indianapolis meeting and delivered an invitation lecture before the Horticultural Club of Boston.

Mr. T. H. Everett has been vice-president of the American Amaryllis Society, regional chairman of the American Rock Garden Society, and a member of two committees of the National Association of Gardeners.

Dr. A. B. Stout received the Thomas Roland medal of the Massachusetts Horticultural Society in recognition of his work in plant breeding.

Works Progress Administration

On January 1, 82 employees of the Works Progress Administration were assigned to regular work at the Garden. This number is slightly lower than last year, consequent on a general reduction of staff effective last July. There has been no change in the character of their employment. They serve as artists, photographers, microscopists, laboratory technicians, clerks, stenographers, herbarium assistants, mounters of specimens, label writers, and general attendants. By reason of their employment, most members of the staff have been enabled to carry on more research than before, various research activities have been undertaken on a larger scale than would have been otherwise possible, and various special activities have been prosecuted which have facilitated research, although not directly a part of it.

On the other hand, it has been impossible under the existing regulations of the Works Progress Administration to secure men for certain lines of work in which additional help is greatly needed. This includes care-takers and watchmen on the grounds, who are greatly needed to safeguard our collections and keep our grounds in order, and common labor, of which we never have a sufficiency.

Staff Members Address A. A. A. S. in Indianapolis

Dr. H. A. Gleason discussed the trends in systematic botany since the beginning of the twentieth century in an address entitled "Quo Vadis?" given as retiring president of the American Society of Plant Taxonomists during the annual meeting of the American Association for the Advancement of Science in Indianapolis the week after Christmas. Dr. Gleason was the first president of the organization, which had its inception in St. Louis in 1935 and was formed a year ago at Atlantic City.

"Species Problems in *Vaccinium*" was the title of an address before the taxonomic section of the Botanical Society of America by Dr. W. H. Camp, who also took part in a symposium with the subject "Our Changing Generic Concepts." Others who debated the question of the concept of the genus included H. H. Bartlett of the University of Michigan, Dr. Edgar Anderson and Dr. J. M. Greenman of the Missouri Botanical Garden, and Dr. E. E. Sherff of Chicago Normal College.

Dr. B. O. Dodge spoke before the general session on "Combined Effects of the Dominant and Recessive Lethals for Ascus Abortion in Neurospora" and demonstrated his thesis before the Genetics Society.

Dr. Fred J. Seaver reported the year's growth of *Mycologia* to the Mycological Society of America, of which it is the official publication. Continuing as editor-in-chief of *Mycologia,* he was also appointed as a delegate from the Mycological Society to the A.A.A.S. Council.

Dr. William J. Robbins, E. J. Alexander, Dr. Harold N. Moldenke, Miss Clyde Chandler, and Dr. Edmund J. Fulling also attended the meetings.

Medal to Dr. Stout

Dr. A. B. Stout is the 1937 recipient of the Thomas Roland medal of the Massachusetts Horticultural Society, it was announced in a letter from the Society in early December. The award was made in special recognition of his work with the breeding of *Hemerocallis* and other plants

The medal was created ten years ago by the Society through the efforts of friends and admirers of the orchidist, Thomas Roland, who was the first to win the medal "for unusual skill in the cultivation of plants." The medal itself and its presentation to him were both a surprise. Last year Elmer D. Smith, chrysanthemum grower and breeder, of Adrian, Michigan, was the winner.

The design of the medal, which is of gold, was created by Mrs. Oliver Ames, and shows a cypripedium from Mr. Roland's own garden.

To J. E. Spingarn was awarded the Jackson Dawson Memorial Medal in recognition of his work with *Clematis.* Frederick Law Olmsted is the first landscape architect to receive the George Robert Whitehead Medal of Honor of the Massachusetts Horticultural Society. Other medals were presented to Alfred Rehder of the Arnold Arboretum; to Richard Wellington for his work in the breeding of fruit at the New York State Agricultural Experiment Station; and to Lord Aberconway, President of the Royal Horticultural Society of Great Britain, for "distinctive service in the field of horticulture." He visited America in the spring of 1937.

Myxomycete Collecting

Every yearly season is different when collecting Myxomycetes. Sometimes there are lean years; again prolific ones. We have seasons when certain species predominate, and in other years the same species are scarce or missing, and others take their places. The past season of 1937 was interesting—although all seasons are, more or less, to an ardent collector—in that many rarely collected forms were found. The word rare is used relatively as there are not so many species of Myxomycetes.

Our usual activities were continued on Long Island. When I say we, I mean that I was accompanied by one or more of my little coterie who have acquired the knack of finding these interesting and pretty forms. We found there again the little pink *Arcyria insignis dispersa,* which I had almost abandoned as lost forever. Also, and for the first time, the iridescent brown variety *globosa* of *Diachea leucopodia.* We attended the

Foray of the Mycological Society of America in New Hampshire in August and found a good half dozen forms notwithstanding the constant rain. Among them was a green *Fuligo septica*—and who ever heard of that before? Always it has been some shade of yellow, white, or red. Our longest time was spent in northeastern Pennsylvania. There in Pike County, the home of rattlesnakes and deer (we saw fifteen of the deer at one time near our abode), we are always sure of "hitting it right." Eight or nine forms which are seldom found, including the scintillating blue *Diachea splendens* and the golden-yellow lumps of *Fuligo muscorum* fell to our lot. At all places, besides, there were hundreds of other specimens.

A visit to Mountain Lake, Virginia, to see old friends and newer ones who are assisting in the good work of collecting, together with some things sent in here by other friends, has brought to the Garden another dozen forms that are little known, some of them having been found only once or twice in this country.

Altogether about 25 extremely rare forms together with more than 700 other specimens have been added to the collection of Myxomycetes, which is rapidly becoming one of the largest in the world.

ROBERT HAGELSTEIN.

Notes, News, and Comment

Vice - president. Dr. William J. Robbins was elected Vice-president of the Botanical Society of America at its meeting in Indianapolis the last week of December.

Annual Meeting. J. E. Spingarn of Amenia, N. Y., became a member of the Board of Managers of The New York Botanical Garden at the annual meeting January 10. Another newly elected member of the Board is Allyn R. Jennings, Superintendent of Parks for the City of New York.

With Joseph R. Swan, newly chosen President, re-elected for the year, Arthur M. Anderson was named Treasurer to succeed Mr. Swan in that post.

Dr. L. H. Bailey, of Ithaca, N. Y., whose three-year term expired with the annual meeting this month, regretfully declined renomination to the Board of Managers because, he said, of his age, his distance from New York, and his commitments. Dr. Bailey is spending much of his time on the contemplated third edition of "Hortus" and on further work for his "Gentes Herbarum," for the latter studying particularly the palms.

Visitors. Dr. David Keck of the Carnegie Institute of Washington, stationed in California at Leland Stanford Jr. University, passed part of the holidays at The New York Botanical Garden pursuing his studies of Penstemon. Raymond Fosberg of the University of Pennsylvania, who is working on the flora of Hawaii and the Polynesian region; Professor Ralph W. Chaney, paleobotanist, of the University of California; Dr. L. H. Bailey of Ithaca, N. Y., and Dr. Ivan M. Johnston of the Arnold Arboretum were among other December visitors at the Garden.

Retirement. Dr. U. P. Hedrick, since 1928 Director of the New York State Agricultural Experiment Station at Geneva, is retiring January 15 on his 68th birthday. He was previously head of the department of pomology, and is the author of many authoritative horticultural works, including monumental treatises on the cherries, peaches, pears, plums, and small fruits of New York, and "A History of Agriculture in the State of New York" which was published in 1933.

Staff Conference. The Verbenaceae was the topic of Dr. Harold N. Moldenke, who reported the progress made in his studies of this family at the December conference of the scientific staff and registered students of the Garden. Robert Hagelstein described his summer's travels in search of Myxomycetes to be added to the Botanical Garden's collections.

Lecture. On December 21, Dr. F. J. Seaver gave a lecture on mushrooms in Horticultural Hall, Boston, Mass., at the request of the Massachusetts Horticultural Society. The following day was spent in the Farlow Herbarium of Harvard University with Dr. David H. Linder, comparing notes on the mycological work of their respective institutions.

Current Literature At a Glance*

By Carol H. Woodward

Beginning with February, 1938, *Chronica Botanica,* which is published in Leiden, Holland, will be issued bi-monthly instead of annually, and the yearly subscription price will be reduced from 15 to 7 guilders. Through ten departments the new periodical will aim at promoting international co-operation among plant scientists, keeping its readers informed of all activities in the botanical world. It will also offer a medium for the speedy publication of short preliminary notes on the results of recent research.

* * *

The original type specimen of *Hicoria fernowiana* Sudw. has been found as a living tree on the grounds of the Department of Agriculture in Washington, D. C. In an article in the September *Journal of Forestry,* of which a reprint was recently received, W. A. Dayton, the discoverer, declares that most of the nutmeg hickories (*Hicoria myristicaeformis*) are undoubtedly specimens of the Fernow hickory, whose botanical name was long ago reduced to synonymy, partly because no type specimen could be found in any herbarium. An uncatalogued pamphlet recently brought to light reveals the type specimen as the tree which is still living.

* * *

Propagation of the red azalea found in Kentucky by Dr. W H. Camp in the summer of 1936 will be attempted from seed during the coming year, Dr. Clement G. Bowers announces in the October *National Horticultural Magazine.* Dr. Bowers and Henry T. Skinner of Cornell brought in some plants from their mountain habitat last summer and now have them under cultivation. They predict that this new azalea, which they declare is in many ways superior to the average specimen of *Rhododendron calendulaceum,* will soon be in the nursery trade.

* * *

Substances responsible for the *direction* of growth in plants, for development and differentiation, still offer an almost virgin field for research, James Bonner concludes in an article on "The Role of Vitamins in Plant Development" in *The Botanical Review* for December.

* * *

Thirty historical trees of the state are depicted in a new publication of the New Jersey Department of Conservation and Development of the Division of Forests and Parks. It is entitled "Noteworthy Trees of New Jersey."

* * *

Half a hundred seed-pods of the common garden snapdragon, *Antirrhinum majus,* constitute a page of awesome goblin faces, which are among the many interesting photographs shown in *Nature Magazine* for December.

* * *

"Know the Evergreens" is the title of an informative article also in the December *Nature Magazine.* The outstanding differences between the common genera of coniferous trees in North America are explained by E. E. Stanford by means of drawings, photographs, and words.

* * *

Writing of "Stowaways" (plants received unexpectedly in soil with other plants), Dr. Fred Stoker, in *The New Flora and Silva* for October, notes that *Parochetus communis* will cover the ground completely beneath a pine tree where few other things will grow. His garden is in England.

* * *

A model of how a bibliography can be made "a guide without being a bore" appears in the 32-page brochure recently published by the United Brewers Industrial Foundation, entitled "References Ancient and Modern to the Literature on Beer and Ale." The selective list of books and papers on the history, manufacture, and uses of these products has been compiled by Isabella M. Cooper. A descriptive paragraph accompanies each reference. Presented by the Foundation "in the public interest of sobriety and moderation," the bibliography includes such topics as Food and Health Values; History, Biography, and Customs; Inns and Taverns; The Brewing Industry; Taxation; Statistics. A list of American periodicals on the subject is given.

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* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Rotenone-yielding plants of South America are the subject of a study by B. A. Krukoff and Dr. A. C. Smith in the *American Journal of Botany* for November. Valuable notes for field workers are given. Three new species are described and seven other plants are discussed in full detail. Dr. A. J. Panshin of Michigan State College writes on the "Wood Anatomy of Certain South American Rotenone-yielding Plants." In the work by Krukoff and Smith, the growing interest in such plants is pointed out. Originally used by the Indians as a fish poison which is harmless to humans, species of *Lonchocarpus* were found to contain rotenone. *Derris*, the powdered root of which also contains rotenone, is a closely related genus. Both are now being widely used as insecticides.

* * *

Vascular plants from Arctic North America which were collected by the Fifth Thule Expedition, in charge of Knud Rasmussen, in 1921-24 have been described in a weighty report by Johs. Grontved, published in 1936 at Copenhagen. One hundred ninety-four species were collected. In an appendix *Draba* is treated by Elisabeth Ekman.

* * *

Allegany State Park, in the southern part of Cattaraugus County, New York, is the subject of a botanical survey in New York State Museum Handbook No. 17. Vegetational areas of the park and adjoining territory are shown in a large folded map in color. More than 200 small photographs adorn the 412 pages, which include an excellent index. Several authors have contributed to the survey, which is published in Albany by the University of the State of New York.

* * *

The same type of endophytic fungus occurs in *Rhododendron* as in *Calluna, Vaccinium,* and other ericaceous plants, H. D. Gordon declares in an article entitled "Mycorrhiza in Rhododendron" in the October number of *Annals of Botany.* Studies which Dr. Gordon made at Edinburgh show, he says, that the endophyte is confined to the roots, that it is not seed-borne, and that it is not essential to the life of the plant.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Travelogue on Roses

A ROSE ODYSSEY. J. H. Nicolas, 238 pages, illustrated, indexed. Doubleday-Doran, Garden City, New York, 1937. $2.50.

Roses have no frontiers: So quotes Dr. J. H. Nicolas in his final book, "A Rose Odyssey." He was quoting an Italian statesman and indeed his book is a veritable quintessence of the universal homage of all nations for the Queen of Flowers. The book is really a travelogue: an account of his many visits to the centers of European rose culture. Dr. Nicolas takes his readers with him to the great gardens and nurseries which for generations have sent rose creations of lasting beauty and form out to the far corners of the world, and in his vivid way he introduces personally the great immortals of the rose: Pernet-Ducher, Nabonnand, Pedro Dot, Miss Ellen Willmott, Rev. J. H. Pemberton, and a host of others whose names are familiar to rose lovers and whose accomplishments have made rose history.

Though not intended as a work on rose culture, the book contains, nevertheless, many choice morsels of cultural information sprinkled throughout, especially when the author discusses European methods of rose growing. It is also copiously supplied with much interesting Old World history.

A firm believer and advocate of an alkaline soil for roses, the good doctor goes out of his way on occasions to prove that the best roses in Europe are produced on an alkaline soil.

Since the publication of the book, Dr. Nicolas has died, and his passing is a loss to the rose industry. Like many great rosarians whom France has given the world he has left behind a record of his labors. He has produced many first-class roses that will remain a lasting monument to his memory.

His "Rose Odyssey" is a fitting climax to his many written works on the rose.

P. J. McKENNA.

Manual for Westerners

RANGE PLANT HANDBOOK. Prepared by the Forest Service of the United States Department of Agriculture. Pages unnumbered. Illustrated with drawings, photographs, and colored plates Indexed U. S. Government Printing Office, Washington, D.C. 1937. $2.50.

Quite the most understandable method yet devised for relating a botanical description to a picture has been introduced in the "Range Plant Handbook" issued by the United States Department of Agriculture. While the system has been used before, it seems to reach its maximum clarity in this volume. Each illustration shows the complete plant, from root to flower, with individual flowering and fruiting parts usually separately enlarged. Beside the picture each portion of the description is bracketed, and an arrow points to the part of the plant being described. Technical words in parentheses often follow the simpler ones of the text. This style has been adopted to facilitate use of the book in the field by range investigators who are not necessarily trained in botany. So that the book may be easily augmented by fresh research it has been published in loose-leaf form, but the volumes being sold by the Superintendent of Documents are firmly bound in cloth. It seems awkward, therefore, to find not the pages, but the leaves, numbered, and these in series rather than as a whole. Material under the four headings of Grasses, Grasslike Plants, Range Weeds, and Browse, takes up well over 500 leaves, with an illustration on practically every right-hand page. There is no key to the plants described, so locating them is difficult, but once the plant desired is found, the information is excellent and the illustration clear-cut and self-explanatory.

The book treats thoroughly 339 different plants, and provides notes on 500 additional species. Gaps in the numbering system of the leaves provide for the later inclusion of 173 more plants of the region covered. The book was prepared under the supervision of W. A. Dayton.

CAROL H. WOODWARD.

Local Flowers, Month by Month

FAMILIAR FLOWERS OF FIELD AND GARDEN. Schuyler Mathews. Revised edition. 310 + xxv pages, illustrated, indexed. D. Appleton-Century Company, New York, 1937. $2.50.

"Familiar Flowers of Field and Garden" is a handy volume for the amateur botanist in the northeastern states. It will be found of special interest and value because it includes the commoner cultivated plants of the region as well as the native and introduced ones. The plants are all in one sequence, whether wild or cultivated, and this sequence is seasonal. The book begins with a description of the trailing arbutus and ends with the cultivated greenhouse chrysanthemum; the chapters treating, in order, the commoner flowers of every month from March to November. Interesting facts are given about each of the 400 species discussed, together with numerous poetic and literary quotations and homely reminiscences of the author. Being an artist and illustrator himself, the author makes a special effort toward exactness in the description and nomenclature of colors. A systematic index, listing all the scientific and common names occurring in the text, together with a table showing the color of each flower, its geographic range, and a floral calendar, all of which is appended, includes about 135 additional species not otherwise mentioned in the text.

Unfortunately this revised edition is practically identical in its text with the original edition of 1895. Some alterations have been made in the introduction, and a foreword and a very short "supplementary systematical index" have been added, but otherwise the new edition perpetuates the many inaccuracies of the earlier edition. The supplementary systematic index, however, is actually a list of errata in which the nomenclature of the text is brought into accord with the seventh edition of Gray's Manual, and so this is really a very important

new addition, although even here mistakes have crept in for instance, "*Hypoxys*" instead of *Hypoxis*—and numerous errors in the text have been overlooked. Curiously, the foreword implies that the Congress of Vienna (1905) has been the only international congress for the stabilization of plant names between 1895 and 1937! The author also repeatedly implies that the volume is intended to be a handbook of the wild and cultivated plants of the entire United States, when actually it will be found useful only in the New England and Middle Atlantic States. Typographic and orthographic errors and misspellings are numerous, but the more than 200 line-drawings by the author are excellent.

H. N. MOLDENKE.

Five Small Useful Books

THE GARDEN PRIMERS. Five little books by Cecile Hulse Matschat. Illustrated with drawings; indexed. Houghton-Mifflin, Boston, 1937. $1.00 each.

Following "The Garden Calendar" of 1936, there are now five more of Cecile Hulse Matschat's little primers to be added to the enthusiastic gardener's library. These small volumes seem to contain all the most necessary information for the small home owner. Each book is complete in itself, written in simple, understandable language. Of special interest at this time of the year should be her book on "Bulbs and House Plants." A great variety of material from which to choose is listed for both indoor and outdoor planting, with short explanatory notes as to color and height, time of planting, culture, and pests and their control. Helpful illustrations and charts of many well known genera, such as *Narcissus, Tulipa* and *Crocus* are included. Several chapters are devoted to house plants, window gardens, terrariums and the forcing of bulbs.

During the long winter months ahead, with outdoor gardening at a stand-still, there is ample time to plan the garden for the coming season. For this, valuable information can be obtained from two of her other books, "Planning the Home Grounds" and "How to Make a Garden." In the latter, much attention is given to one of the most important parts of gardening, the preparation of good soil and the use and value of the different natural and commercial fertilizers. Detailed directions for seed-sowing and other methods of propagation help to make this a handy reference book.

"Planning the Home Grounds" will be a welcome aid to people who consider buying or building a new home, for it refers to problems from the selection of a suitable home site to the finished result. Scattered throughout the book are numerous plans and sketches, showing various arrangements of gardens.

The beauty of the garden depends a great deal on the plant material used. An abundant selection, suitable for all kinds of purposes and locations, is available in the last two of Mrs. Matschat's little books, one on "Trees and Shrubs" the other about "Annuals and Perennials."

All five books should be indispensable to any garden lover, and to some extent prove beneficial even to the professional gardener.

HILDEGARD SCHNEIDER.

A Woman Explorer

NORTH TO THE RIME-RINGED SUN. An Alaskan Journey. Isobel Wylie Hutchison, 262 pages, illustrated with photographs, drawings, and sketches in color by the author. Hillman Curl, New York, 1937. $2.50.

Isobel W. Hutchison's Alaskan journey is the account of the author's astonishing trip from England to Alaska by herself, to collect botanical specimens for Kew Gardens and ethnological data for Cambridge University.

The author is not a mere collector, but an artist as well, and a good companion who finds the interesting people wherever she is and presents them to the reader very pleasantly. Moreover, the journal is very well written. Scenery is adequately described, and botany, Indians, or Esquimos are touched upon so as not to be intrusive for the layman. The scientist can be satisfied by the lists at the end of the volume. Poetry, humor and quite amazing experiences are altogether so delightfully presented that the book cannot fail to hold one's interest and arouse one's admiration.

JULIA T. EMERSON.

THE NEW YORK BOTANICAL GARDEN

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Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

The classes of membership and types of benefaction are as follows:

Annual Member	annual fee	$ 10
Sustaining Member	annual fee	25
Garden Club Affiliation	annual fee for club	25
Fellowship Member	annual fee	100
Member for Life	single contribution	250
Fellow for Life	single contribution	1,000
Patron	single contribution	5,000
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Contributions to the Garden may be deducted from taxable incomes. The following is a legally approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

FEBRUARY, 1938

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EVERGREENS

Every genus of coniferous evergreen which is hardy in northeastern United States is represented in the New York Botanical's large collections of trees. The Pinetum, where most of them will be found, extends roughly over nearly thirty acres of landscaped ground, which includes near its western boundary Conservatory Range No. 1 and the principal flowering borders of herbaceous plants.

To the landscape architect, park superintendent and property owner who wish to learn the characteristics of hardy evergreens in cultivation, the Botanical Garden offers an exceptional opportunity for study. Here the prospective planter may see the evergreen trees and shrubs in suitable locations as regards the presence of other trees and the contour and aspect of the land. The planting of the members of each genus in close proximity means that the differences between related trees, such, for instance, as the two useful Asiatic firs, *Abies Veitchii* and *A. Nordmanniana,* may be readily learned by first-hand observation.

The planter who desires to go further into the study of suitable types of evergreens for his grounds will find in the library in the Museum Building an abundance of material covering every phase of the subject—descriptions of the conifers of all regions of the world, information on those in cultivation in America, historical material which for the zealous reader can make a living personality out of every tree, and practical instructions in any number of books on the selection and cultivation of evergreens.

These services, including the use of the library for reference, are all offered free to the public.

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It is with deep regret that this Journal announces the death on January 20 of Dr. John K. Small, who had been a member of the Botanical Garden's staff since 1898. A biography of Dr. Small by Dr. John Hendley Barnhart, who was one of his closest associates during his forty years' work with the Garden, will appear in a forthcoming issue of the Journal.

Some Choice Coniferous Evergreens For Ornamental Planting

By E. H. Fulling

THE brilliant colors of annuals, the permanence of perennials, the colored fruits of berry-bearing shrubs, and the autumnal pageant of deciduous trees all have their places in those organized collections of plants we know as gardens, and without these assets our landscapes would indeed be drab and dull. There is, however, another group of plants, equally important, and it is they, the coniferous evergreens, which in combination offer permanence, dependability, and the choicest of backgrounds for all the other groups. Modest in colors but rich in tones, their universal green and majesty of form are the focal points around which the finer details of gardening may be laid.

Let us briefly consider some of the choicest among these plants, of which there are many, various in size and habit. All of those to be described here, except the junipers, attain tree-like proportions and consequently need ample space in the garden. They are all well known in cultivation and can be secured from most large nurseries. Illustrations of some of the subjects will be found on pages 36 and 37.

Pines

The pines, world-wide in natural distribution, offer many species worthy of cultivation and ornamental use. Unlike most of the spruces and firs, they do not lose beauty with age, but gain in character and picturesque appearance.

Swiss Stone Pine (*Pinus Cembra*). Native to the cold mountainous regions of central Europe and to northern Asia, this hardy tree of formal pyramidal habit is valuable where limited space demands a compact tree that will not spread. Slow-growing, it is seldom observed in cultivation more than 20 feet tall.

Himalayan White Pine (*Pinus excelsa*). Possessing the longest needles among the soft or white five-needled pines, this tree is a genuine aristocrat among ornamental conifers. The long pendulous bluish-green leaves give the tree a graceful aspect but it is wide-spreading and requires abundant room.

White Pine (*Pinus Strobus*). No consideration of pines can afford to neglect this well known bulwark of early American colonization in which its lumber played so vital a part. When young it hardly competes in beauty with other species but when old it is unsurpassed and forms the principal motif in many a beautiful landscape.

Scots Pine (*Pinus sylvestris*). Irregular and spreading in habit, with attractive orange-colored bark, the Scots pine has long been a commonly cultivated and popular ornamental tree. In Europe, over large areas of which it is native, it is one of the principal sources of lumber.

Spruces

Among the spruces also we find excellent material when large evergreens are needed for backgrounds or screening. They are said to withstand smoke and dust better than the firs, and are not particular as to soil conditions so long as good drainage is provided.

Norway Spruce (*Picea Abies*). This is one of the most commonly planted evergreens but unfortunately it is often used in foundation plantings and similar small groups where it soon grows taller than is desirable. It is as a specimen tree or in a windbreak or hedge that it is especially useful. In older trees the crown frequently suffers when the height of the tree exposes it to winds above surrounding vegetation.

Many horticultural forms of this species are known, marked by color or shape of leaves, by pyramidal or columnar habit, by pendulous branches, or by dwarfed stature.

Serbian Spruce (*Picea Omorika*). This tree from southeastern Europe is one of the best of ornamental spruces, a species that is entirely hardy and a vigorous grower. It differs from most spruces in possessing flattened needles, and their distribution along the branches is a distinctive and attractive feature.

Oriental Spruce (*Picea orientalis*). The distinctly short and lustrous needles of this species from the Caucasus and Asia Minor readily identify it and provide an appearance which makes this tree more suitable than other spruces in those situations where coarse foliage would not be so pleasing.

Tiger-tail Spruce (*Picea polita*). The lustrous green needles of this spruce are so stiff and prickly that contact once made with them leaves a lasting impression which, along with its conspicuous dark winter buds, readily identifies the tree. This species from Japan is a slow growing hardy tree and one of the most distinctive of all the spruces.

Colorado Spruce (*Picea pungens*). This tree of our western states is quite variable in the color of its bluish-green foliage, and repeated grafting of extreme forms has yielded the abundance of blue spruces which are so characteristic of our gardens. A truly beautiful tree, in groups or as individual specimens, the blue spruce has the one unfortunate feature that after twenty or thirty years the lower branches die off and the handsome symmetry of the tree is destroyed.

Firs

Firs provide us with trees of softer foliage, in appearance as well as texture, than the somewhat similar spruces, but only a few kinds are commonly and successfully planted.

White Fir (*Abies concolor*). A native of the relatively dry eastern regions in the Rocky Mountains of North America, this fir has been found the most suitable of its clan for the equally dry climate of the eastern states. It grows up to fifty feet in height and its glaucescent blue-green leaves, especially in spring, always add a pleasing tone to any large planting of darker-hued conifers.

Nikko Fir (*Abies homolepis*). The preferred place of the white fir among our native species of *Abies* is shared by the Nikko and the following species among the exotic representatives of the group. Growing as tall as the white fir, but darker in foliage, the Nikko has proved itself one of our most valuable introduced evergreens.

Veitch's Fir (*Abies Veitchii*). Rivaling the Nikko fir in its popularity and success as an introduced species, Veitch's fir, from the same land of Japan, is also a dependable subject throughout our northeastern states.

Nordmann's Fir (*Abies Nordmanniana*). Another popular and valuable introduced species, having very lustrous dark green foliage, is Nordmann's fir. Pyramidal in habit and quite hardy if given a little protection while young, this tree is well suited to a specimen position on large open areas. It hails from the Caucasus, Asia Minor and Greece.

Douglas Fir

Douglas Fir (*Pseudotsuga taxifolia*). This tree, attaining a height of more than fifty feet in the eastern states, is particularly valuable for windbreaks and mass planting. As specimen trees

Juniperus squamata, forming a mat of gray-green foliage, is a select species for bedding purposes.

too it is suitable, and the cones are especially ornamental by virtue of their conspicuously projecting bracts.

Yew

Japanese Yew (*Taxus cuspidata*). There is probably no other coniferous evergreen more dependable, so far as vigor and hardiness are concerned, than the Japanese yew. Tree-like or spreading in habit, according to the particular form, it is one of the most valuable of our cultivated evergreens.

English Yew (*Taxus baccata*). Though not so hardy as the Japanese yew, this species too is valuable in a variety of forms and does well if provided with some protection against winter winds.

Hemlock

Canadian Hemlock (*Tsuga canadensis*). The native hemlock of our northeastern states is one of the most hardy of ornamental trees, tolerant of shade, and an excellent species for windbreaks and mass planting. Delicate in foliage and wide-spreading, the Canadian hemlock attains fifty feet in height under cultivation but almost twice as much in the wild.

Two useful junipers among the rocks in the Thompson Memorial Rock Garden are the creeping juniper and the tamarix juniper, the latter in the corner at the right.

Carolina Hemlock (*Tsuga caroliniana*). A true aristocrat among evergreens, the Carolina hemlock has frequently been rated the handsomest of ornamental conifers. It resembles its northern relative in general appearance but a certain quality of its beautiful foliage bestows particular merit.

Junipers

Excellent material for rock gardens, for covering slopes, and for the forward areas of foundation plantings is offered by many low-growing forms of juniper, which maintain their prostrate nature for life. They are especially suitable for providing permanently green aspects in beds of herbaceous annuals and perennials which otherwise are lifeless and drab during a portion of the year.

Creeping Juniper (*Juniperus horizontalis*). A native of sandy, rocky, and exposed locations over wide areas in our northeastern states, the natural species is sometimes employed in ornamental uses, but variations of it which have been found have been propagated more extensively as clonal varieties. Among several such forms the following is the best known and certainly one of the choicest:

Waukegan Juniper (*Juniperus horizontalis Douglasii*). This distinctly trailing form is valued because of the steel-blue aspect which its leaves bestow upon the entire plant, a hue which turns to glaucous purple in late autumn. In twenty years' time it is reported to develop a low mass twelve to fifteen feet across.

Himalayan Juniper (*Juniperus squamata*). An introduction from the Himalayan region of Asia, this species has entered our trade as another valuable ground cover. Useful in covering slopes, it also forms handsome flat conical mats four to six feet across, a foot or so deep in the center.

Meyer's Juniper (*Juniperus squamata Meyeri*). This form is upright, growing three feet tall, and is probably the bluest of all cultivated conifers, particularly in spring, when its color surpasses that of the bluest blue spruce.

Savin Juniper (*Juniperus Sabina*). This commonly planted species may grow six feet tall after a great many years but ordinarily it is seen only as a graceful upwardly reaching evergreen about two or three feet high. The following clonal variety of it is especially desirable.

Tamarix-leaved Juniper (*J. Sabina tamariscifolia*). As a low spreading shrub rising above the ground scarcely more than a foot, this form is especially valuable where a low dense covering is desired. In habit and general appearance it is very similar to and easily confused with the creeping juniper and the latter's forms.

Arborvitae

Fan-shaped branchlets with flat scale-like leaves distinguish the arborvitaes at a glance from other conifers.

American Arborvitae (*Thuja occidentalis*). Probably the most commonly planted ornamental conifers in American gardens represent various forms of the native arborvitae, either as individual plants or closely set and trimmed into formal hedges. There are numerous horticultural varieties of this species, many of doubtful ornamental distinction, and it is probably only the collector or connoisseur for whom they possess any real value.

Oriental Arborvitae (*Thuja orientalis*). This species, more formal in habit than the preceding, also is abundantly employed and is said to be superior to the American form for windbreaks and hedges because of its denser and more compact habit. It too is known in a variety of forms, most of which are distinguished by the foliage being in vertical planes.

Giant Arborvitae (*Thuja plicata*). Native to our northern Pacific Coast states, this species has entered our gardens as a very handsome and fast-growing tree, one of the most beautiful of the larger conifers.

Japanese Arborvitae (*Thuja Standishii*). This representative from Japan is the most distinct of its clan, for it possesses an erect leader and drooping branchlets which render it the most graceful of all forms of arborvitae.

Golden Larch

Golden Larch (*Pseudolarix amabilis*). A handsome tree up to 30 feet and more in height, but seldom seen in cultivation, is the golden larch from eastern China. It possesses pale green foliage which in autumn, just before the leaves of deciduous trees fall, turns a brilliant deep yellow and converts the tree into one of the most striking spectacles a garden can possess.

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The Chinese Water-chestnut, Scirpus tuberosus

By W. M. Porterfield

(No. 2 of a series on Chinese Vegetable Foods in New York)

THE Chinese water-chestnut being treated here is the rather flattish corm of a sedge, botanically known as *Scirpus tuberosus* Roxb. (or by the synonym *Eleocharis tuberosa* Schult.) It bears no relation to the other water-chestnut, *Trapa natans* L., that often appears in lists of plant names. Though also found in China, the plant that for a long time has had the name of water-chestnut in the western world is an attractive, hardy, aquatic plant which bears true nuts characterized by two or four horns. It is sometimes known as Jesuit's nut or water caltrops.

Several different Chinese names have been given to the Chinese water-chestnut which is our present subject: Maa-tai, Pi-tsi, Wu-yü, and sometimes Ma-hai. As sold in the markets the corm is dark mahogany-brown in color and ranges from four to five centimeters (two inches, more or less) in diameter. The meat, which is succulent like an apple, is of uniform consistency and is sweet to the taste. It is eaten either raw or cooked. During the winter all the Chinese vendors stock up on water-chestnuts, for they are very popular. They first pare them, then impale several on a bamboo stick, and sell them to the passer-by, who munches them raw. Many times have I also eaten them as they were cooked and served in the homes of foreigners in China as one of the vegetables of the meal. Their taste is delightful, not unlike that of sweet corn although different in texture. Sliced water-chestnuts enter as one of the ingredients of chop suey, and shredded they often appear in meat and fish dishes. Americans who take the trouble to shop in the Chinese markets are finding them delectable in salads and soups.

It is said that the Chinese water-chestnut also possesses medicinal virtue. Roxburgh[1] quotes parts of a letter from Mr. Duncan, who transmitted samples of the corm from Canton to the East India Company's Botanical Garden at Calcutta.

"The children here often play with cash in their mouths," he wrote, "which at times slip down into the stomach and bring on

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[1] Roxburgh, Wm. Plants of the Coast of Coromandel. **3**: 25-26. 1819.

alarming symptoms. The nut is immediately given in quantities, either raw or boiled, and they say it never fails to give relief, and is always considered as specific; they allege it decomposes the metal."

In respect to its analysis it has been certified that the amounts of cane-sugar in water-free samples of the Chinese water-chestnut are very high, averaging 27.5 percent, while the protein is rather low, in the original material lower than in taro (*Colocasia*

Base of a plant of Scirpus tuberosus, raised by the author at The New York Botanical Garden, showing the original corm with the young corms at the ends of the stolons. The Chinese characters designate "Ma-hai," one of the native names for the water-chestnut.

antiquorum), as Blasdale[2] points out. The starch content ranges between 7 and 8 percent in the fresh corm. The amount of water is about 77 per cent.

The plant from which the corms are obtained grows in stagnant water and sends up cylindrical hollow leaves which project above the water level. The time of maturity is September. In general, according to Meyer[3], the plants need a hot summer to mature and are grown on a muck or clayey soil covered with several inches of water very much as rice is grown. The plants are set in hillocks three feet apart in soil enriched by hog manure, then they are flooded and left submerged until the frost kills the foliage, when the water is drained off and the hillocks are dug for the corms. In the letter quoted by Roxburgh[1] Mr. Duncan speaks of the cultivation of water-chestnuts in manured tanks. Human manure is used which after exposure to the sun is mixed with the slimy sediment at the bottom of the tank. Cuttings of the plant or corms are set in it about the end of March and then the tank is flooded. The new crop is ready by September. [*Turn to page 38.*]

A trio of Chinese water-chestnuts, natural size, as found in the Chinese markets in New York.

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[2] Blasdale, W. C. A description of some Chinese vegetable food materials. U. S. D. A., O. E. S., Bull. **68:** 16. 1899.

[3] Meyer, F. N. U. S. D. A., B. P. I. Plant Immigrants (132): 1148. 1917.

William Roxburgh's original illustration of Scirpus tuberosus, to show the manner in which the corms are produced. This was published in 1819 as Plate 231 in his "Plants of the Coast of Coromandel."

RELIABLE EVERGREENS FOR THE NORTHEASTERN STATES

1

. *Nikko Fir, one of the choicest exotics for specimen planting.*

White Pine, a typical aged specimen.

. *Japanese Yew, effective in wintertime or summer.*

Blue Spruce, time-honored variety in landscape work.

. *Austrian Pine, one of the best of the European conifers in America.*

3

4

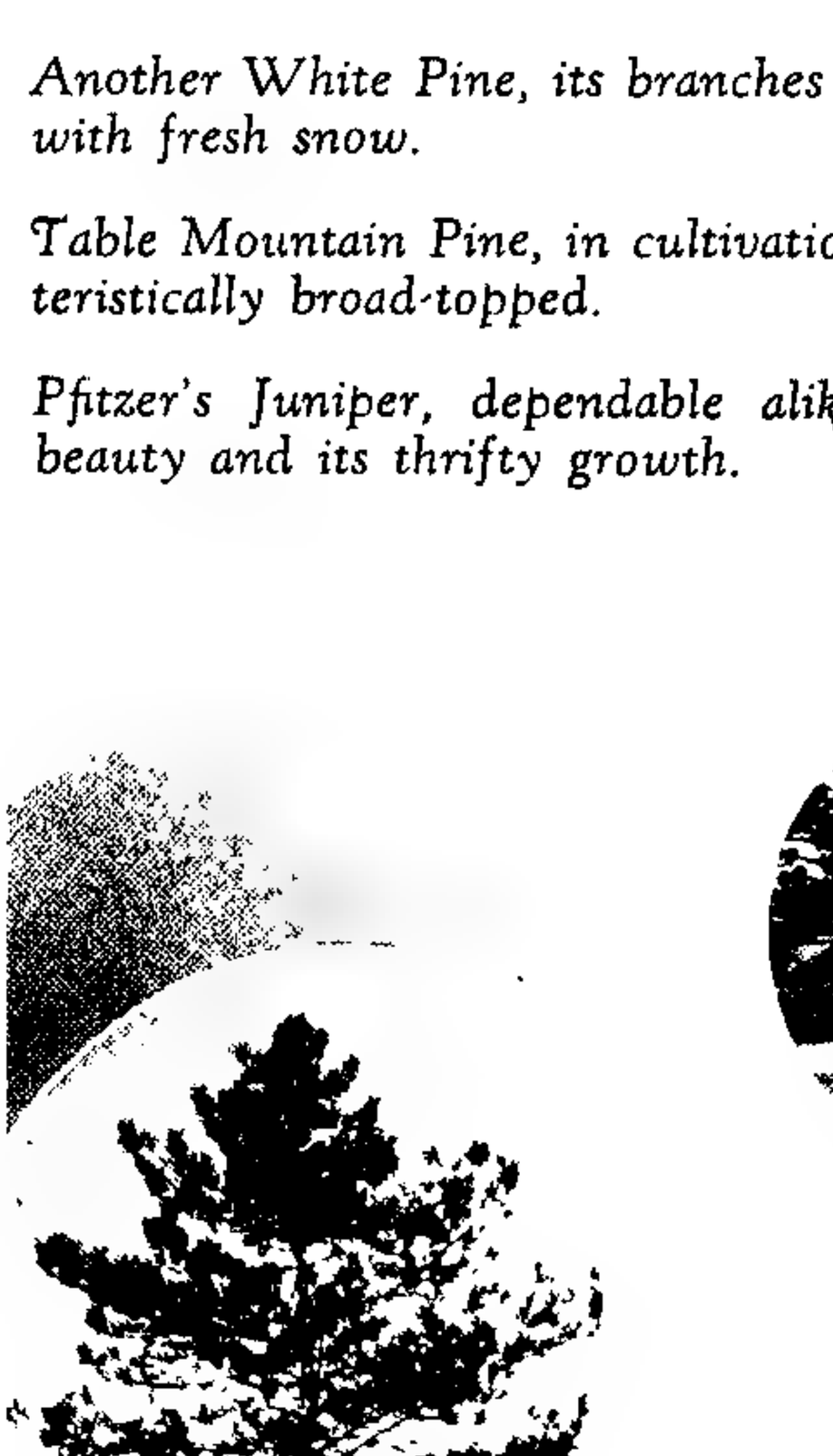
6

Another White Pine, its branches burdened with fresh snow.

Table Mountain Pine, in cultivation characteristically broad-topped.

Pfitzer's Juniper, dependable alike for its beauty and its thrifty growth.

7



The water-chestnut grows all over China as far north as Chihli province, and it has long been known as a useful edible plant. Martini[4] in his "Atlas Sinensis" (1655) lists it among the useful plants and gives its Chinese name as Pi-ts'i. He also calls attention to its acid qualities and to the fact that a copper coin if put into one's mouth with the "fruit" may be reduced to an edible pulp that can be chewed quite easily. George Joseph Kamel[5], a Jesuit missionary to the Philippine Islands, observed its habit of growth but did not see the flowers. He mentions the plant in his "Syllabus Stirpium" which forms the appendix to the third volume of Ray's "Historia" (1704). Roxburgh's reference to it has already been noted. Robert Fortune[6] in his travels in China found in the southern provinces among other vegetables in great demand the Chinese water-chestnut. Augustine Henry[7] refers to the water-chestnut as *Scirpus plantagineus* Retz in his "Notes" in discussing the overlapping of the Chinese terminology.

Chinese water-chestnuts bought in the Chinatown shops are good to eat as a cooked vegetable as described above. To grow them the corms can be planted in submerged flower pots and kept in the greenhouse during the winter. When planted in a pot containing leaf-mold and topsoil with a little sand and placed in a crock full of water they will germinate readily. When the leaves reach the water level, the plant may be repotted with a cow-manure compost. Growth should then be vigorous, and corms should be mature in six months.

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[4] Bretschneider, E. Early European Researches into the Flora of China. Journ. N. Chin. Br. Roy. As. Soc. **15**: 1-194. 1880.

[5] Bretschneider, E. History of European Botanical Discoveries in China. p. 16. 1898.

[6] Fortune, Robert. Three Years' Wanderings in the Northern Provinces of China. 307. 1847.

[7] Henry, Augustine. Notes on Economic Botany of China, p. 27. Shanghai. 1893.

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New Gardening Courses Begin In March

EVENING and afternoon courses in practical gardening, one of which will be offered to men exclusively, will commence in March at The New York Botanical Garden and continue through two months or more of the spring season when the principles learned can be directly applied in home gardens.

The first course, "Introduction to Gardening," will comprise eight evening lectures, one hour in length, given at weekly intervals and illustrated with colored lantern slides. Starting March 3 at 8 p.m. in the Museum Building, the series will be continued every Thursday evening (except March 17) through April 28.

P. J. McKenna will be the lecturer. The cost of the course is eight dollars. Established members of the Garden and persons subscribing to new memberships will be permitted to take the course without additional charge. An outline of the course appears below.

"Gardening Practice for the Home Grounds" is the title of a daytime course which will occupy ten afternoons beginning Wednesday, March 23. *On Saturdays the course will be repeated for a class to consist exclusively of men.* None of these courses, however, will be given for less than ten students.

The afternoon course will include demonstrations and gardening practice outdoors as well as illustrated lectures in the Museum Building. Each session will open with an hour's talk by P. J. McKenna, after which the class will adjourn to the grounds for a chance at actual work in digging, planting, pruning, and such essential manual tasks.

Members of the Garden will be given credit in registering for the "Practical Gardening" course, the cost of which is $15, up to the amount of their annual membership fee.*

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* That is, members who pay the Garden an annual fee of $10 will need to pay only $5 additional when they register. Sustaining members, whose annual fee is $25, may enroll in the course without making further payment. All members receive the *Journal* of the Garden every month as well as *Addisonia* semi-annually, each number of which is illustrated with eight colored plates and descriptions of flowering plants. They also receive a share in the distribution of surplus plants, announcements of special displays, and other privileges.

While the evening course is entitled an "introduction," it is not a prerequisite to the course in practical gardening. Both of these courses are especially designed for the home owner who does not necessarily have greenhouse facilities and who must perform his gardening tasks in a simple yet practical and efficient manner. No plant material will be raised by the students, but the lessons will occur at such a time that, soon after each session the members of the classes may practice what they have learned in their own gardens at home.

The subjects to be covered in the lectures are outlined below, although they will not necessarily be given in the order listed. The suitability of each topic for the state of the season will determine the order of arrangement.

INTRODUCTION TO GARDENING

Museum Building, New York Botanical Garden, 8 p.m., starting Thursday, March 3, 1938.

1. ***The perennial border, its preparation and management:*** Which perennials to select and how to arrange them; soil preparation to insure the garden's success in years to come; summer culture of the plants, including staking, soil cultivation, and feeding.

2. ***Annuals and their culture:*** The planning of an annual border; raising of the plants; selections of hardy and half-hardy annuals and annuals for fall bloom.

3. ***Roses:*** General care for the production of sturdy plants and good flowers; summer culture and fall bloom; pruning of hybrid teas and hybrid perpetuals and of various types of climbing and rambler roses; pests and diseases and how to control them.

4. ***Summer bulbs and tubers and their uses:*** Gladioli, Dahlias, Tuberous Begonias, Tuberoses, Galtonias, etc.

5. ***Hardy shrubs:*** How to plant and maintain hedges, groups, and individual specimens; soil preparation; propagation; varieties.

6. ***Lawns:*** Soil preparation; quantity of seed and methods of sowing; suitable seed mixtures; maintenance of established lawns.

7. ***Vegetative propagation:*** Methods of growing new plants from cuttings of stem, leaf, and root; multiplication by division; new growth from suckers, layers, and by other methods.

8. ***Rock gardens:*** Placing of rocks; proper soil mixture; selection of plants; planting; general care.

GARDENING PRACTICE FOR THE HOME GROUNDS

Museum Building, New York Botanical Garden, 2-4:30 p.m., starting Wednesday, March 23; men only in a special class Saturday, March 26; each session comprising 1 hour of lecture plus 1½ hours of practical demonstrations.

1. ***Preparing the ground for planting:*** Digging and double digging, and the necessity of treating the subsoil; drainage and the effect of surplus water; manures and fertilizers and their proper applications; injurious soil practices.

2. ***Pruning:*** Roses—hybrid teas and hybrid perpetuals, climbers, and ramblers; vines; shrubs; fruit trees.

3. ***Lawn making and maintenance:*** Preparation of the seed bed; grasses for special situations; seed mixtures; getting an even seed distribution; quantity of seed; maintenance of the lawn—cutting, feeding, pest control.

4. ***Planting:*** Trees and shrubs, including roses; planting distances and other rules for perennials, with attention to deep and shallow rooting kinds; how to plant bulbs, tubers, and roots.

5. ***Seed sowing and raising of young plants:*** Treatment indoors in pans and flats; use of coldframes; outdoor methods; care of seedlings.

6. ***Potting and repotting:*** Methods of potting different kinds of plants; importance of size of pot; repotting and when to do it; handling of bulbs and bulbous plants in pots.

7. ***Disease and pest control:*** The more common diseases and insects; materials used in controlling them; how to mix and apply spray material; dusts and dusting methods.

8. ***Vegetative propagation:*** Hardwood and softwood cuttings and when to take them; leaf cuttings; root cuttings; divisions; layering; grafting; budding.

9. ***Coldframes and hotbeds:*** Design and aspect of coldframes and how to get maximum results from their use; watering, ventilating and hardening off of plants; how to make and use a hotbed; materials used for heating.

10. ***Maintenance of ornamental plantings:*** Feeding, cultivating, staking, watering, mulching; disbudding and pinching for increased bloom; winter protection.

Hour Changed to 3 p.m. For Spring Lecture Series

For the spring series of Saturday afternoon lectures at the Garden, the hour will be 3 p.m. instead of the former 3:30.

Several new speakers will appear on the forthcoming programs: Nelson M. Wells, who is president of the City Gardens Club; Jessie G. Fiske, a professor at Rutgers University and seed analyst for the State of New Jersey; and Allyn R. Jennings, General Superintendent of Parks for the City of New York and a member of the Garden's Board of Managers.

The complete schedule of lectures on Saturday afternoons during March, April, and May is printed below.

Mar. 5 ***Plants in the Modern City***
Nelson M. Wells, President, City Gardens Club

Mar. 12 ***Bulbs in the Rock Garden***
Ethel Anson S. Peckham, Honorary Curator

Mar. 19 ***The Miracle of Seeds***
Jessie G. Fiske, New Jersey State Seed Analyst

Mar. 26 ***Edible Mushrooms and How They Grow***
William S. Thomas, Author of Field Book of Mushrooms

Apr. 2 ***Photography in the Garden***
Fleda Griffith, Artist and Photographer

Apr. 9 ***The Garden's First Year***
T. H. Everett, Horticulturist

Apr. 16 ***Hayfever Plants of America***
R. P. Wodehouse, Author of "Pollen Grains"

Apr. 23 ***Our City's Parks and Playgrounds***
Allyn R. Jennings, General Superintendent of Parks

Apr. 30 ***Where Spring Flowers Grow About New York***
E. J. Alexander, Assistant Curator

May 7 ***A Summer Program of Plant Protection***
B. O. Dodge, Plant Pathologist

May 14 ***Traveling Through Switzerland***
H. N. Moldenke, Associate Curator

May 21 ***Showy Flowers of Florida***
H. Beaman Douglass, M.D. (retired) Lecturer

May 28 ***Lilies for Gardens***
A. B. Stout, Curator of Education and Laboratories

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Open Letter to an Author

THIS IS OUR WORLD. Paul B. Sears. 292 pages, illustrated by the author. University of Oklahoma Press, Norman, Oklahoma, 1937. $2.50.

My dear Dr. Sears:

It is not so long since we parted at Indianapolis. During the long miles of my return I recalled some of the things we had talked of and, as the fast moving train slipped over the rolling fields and later around the steep slopes of the mountains, your words came sharply into focus, for the scenes I passed were not always pretty ones. Hills too steep to either farm or pasture, stripped of their once green growing forest, are now barren scars of raw earth devoid of moisture-holding humus; abandoned pastures and fields washed bare of all good soil; roily streams drooling clots of mud, no longer covering their bottoms with rich alluvium but rather with a crust of raw silt; a land which in a scant one hundred years has been denuded of the covering of rich soil which a thousand years will not replace. And worst of all, I saw bare farm-yards and houses in disrepair. There are some who will think of these as temporary things due to a passing disruption of our "economic system," but all of us who think of things biologic beyond the immediate present know that this is not true. Such things are symptomatic of the acute diseases which, all too insidiously, creep into and finally destroy civilization—a civilization based upon the ruthless exploitation and destruction of natural resources.

Far to the south where Mexico narrows to an isthmus there was a once fat and laughing land. Not so many hundreds of years ago it was teeming with people. I have seen the roads they constructed; I have walked the streets of cities they built, cities which held a million people; I have gazed with wonder at temples greater than those of the Nile. But the roads are abandoned, the cities naught but mud mounds, the temples fallen to ruin and the people who once lived and worshipped there are scattered and living in squalor. And all of this in spite of the fact that they still know, as they knew even in the ancient times, the necessity of contour plowing, the building of brush and log dams to stop the erosion of gullies; in spite of the fact that terraces have been constructed and unplowed contour strips left in the fields. In spite of the fact that many of the practices which we think of as being new to soil conservation have been used there for centuries, I found a barren land peopled by a race sunk so far below their once great level that they consider as opulent a standard of living based upon *ten dollars per year per person.* In some of the houses where I stayed three dollars per year per adult was the standard.

On my return, I found your latest book on my desk. I like it. It is a book of truth, of naked truth tempered with humor and the deep love of humanity. But in spite of your optimism I am wondering whether you, as a student of biological phenomena, have not too seen a ghost walking across this, the land of our fathers. Otherwise how could you have written lines like these? "It is needful that we relax the pace at which we have driven this servant and guide, the man of science, so that he may catch his breath and speak for himself." "No animal can survive the destruction of its nesting habits, not even man." "There are no more frontiers no more wilderness, unless it be the wilderness of man's own creation."

As I write this in the dusk of my laboratory, I see the lights of a great city blinking in the frosty twilight. Is it the fate of this city to pass as have so many in the past? Have we forgotten, as did the others, that the wealth of a nation lies not in hard dollars but in productive soil? You must have had these things in mind when you wrote: "The drainage ditches and dumps from a modern city may be unsavory places, but if the city were to disappear, they might constitute

its only record. . . . " "The . . earth is far more essential to man than he is to it. Earth has calmly witnessed the passing of many interesting kinds of life when they ceased to be fitted to her conditions. Certainly man should be somewhat cautious in dismantling an abode so admirably fitted to him, for in the very nature of things he is not the one to have the last word."

As you have so aptly pointed out, we as humans are an integral part of the biological cosmos and as such must return to the application of fundamental principles if we are to save ourselves. This, in spite of the fact that it sometimes appears that we must be "saved from ourselves." " . . . We have a system of happiness, yet we are somehow lacking in the happiness itself." "This is our world" and you have indicated the path we must choose if we are to achieve a cultural pattern leading to a lasting and truly abundant life.

Sincerely yours,

W. H. CAMP.

On Greenhouses

GREENHOUSE CULTURE FOR AMATEURS. Edith Grey Wheelwright. 163 pages, index, photographs. Country Life, London, 1937. $2.50.

Upon reading Miss Wheelright's book, "Greenhouse Culture for Amateurs," it is apparent that this treatise was not primarily designed for the novice but rather for the more enthusiastic type of home gardener. It would be hard to find another book of its nature containing such a select and unusual list of the finer types of greenhouse plants and their culture. Especially outstanding is the chapter on bulbs, which covers a formidable list of South African species and many others, with little mention of the more easily cultivated hybrid narcissi and tulips.

Since this book was written primarily for English conditions, the American reader could hardly cope with many of the plants mentioned unless cultural modifications are considered. Even the types of glasshouses designed for the small home would hardly be practical where weather conditions are so extreme. However, if this book can do no more than to stimulate an interest in glasshouses in this country it has accomplished a worthy cause.

JOSEPH W. TANSEY.

For the Rock Gardener

NORTH AMERICAN ROCK PLANTS. W. H. A. Preece. 204 pages, index, photographs. Macmillan, New York, 1937. $3.50.

Random selections of plants, since time immemorial, have been brought forth by all kinds of gardeners. In days when botanists were more commonly also gardeners, even the most learned of them would take time off between tomes of systematy for "Eclogae" and "Deliciae" and "Enumerationes" of choice and intriguing plants they had grown. They described them with such painstaking accuracy, and illustrated them so handsomely that, after a century or two, these works still serve the student and entice the gardener who comes upon them. That was plant portraiture at its best:—not the least bit less inspiring because of the accurate skill employed in it. But since botanists have practically left off doing this sort of thing for the benefit of horticulture, gardeners have been obliged to publish their own "eclogae" to the best of their ability. Among them, the skill of accurate rendering has almost passed into oblivion and it hardly occurs to the horticultural critic of today to evaluate current work from this angle. The "good job" now is one with promotional value:—one which makes mouths water.

By such standards, Mr. Preece's bundle of North American Rock Plants, in an appealing jacket of exotic-looking Primula, stands highly commended; and it compares favorably with the average of popular plant literature. From a viewpoint of accurate description and factual value, it leaves much to be desired.

It is not quite portraiture to say, of *Phlox caespitosa, diffusa* and *Douglasii,* that "after a period of years of close personal acquaintance a kind of instinct is acquired which enables one to assert with confidence that a particular plant belongs to this or that species." In other instances, descriptions of species are manifestly based upon observation, not of the species, but of one or another form. For example, in *Iris cristata* the flowers are not always a "pale, horizon-blue." There are pale and darker shades of blue and lilac blue; and there is not only "a white-flowering form," but there are white-flowering forms, with and without the yellow crest.

Distribution data are not always correct. *Sieversia ciliata* (perhaps more familiarly known as *Geum ciliatum*) has a more eastward range than is indicated. So has *Vaccinium caespitosum.*

The historical data under *Shortia galacifolia* will bear checking. The plant was discovered by Michaux (not Micheaux) in 1788 (not '89) and first rediscovered in 1877 (not 1886). Moreover, the plant is not confined to any one locality, and there is no Sapphire County in North Carolina.

These and other inaccuracies detract from the value of the book as a record of plants.

The author has done better justice to the gardening aspects. Yet, as in the best of books, there is room, here, for marginal notations and questionings.

On page 60 it is said that *Dryas octopetala* may be propagated by the removal of rooted pieces. True, if it is done during that brief period in late summer when new roots are beginning to bore down from the younger branches, and before these roots become at all woody. For the culture of *Shortia galacifolia,* well-rotted leafmold with sand is indicated, but not acidity, which seems to be a requisite.

With all this, Mr. Preece's book is, indeed, far superior to a great deal of contemporary popular plant literature. It is the fruit of personal experience. The author is to be complimented, particularly, upon his inclusive interpretation of what are rock garden plants. Apparently he holds that American rock gardening is a thing of broader significance than the mere growing of alpine plants.

The reviewer admits that, though his botanical appetite was not satisfied, his mouth was made to water. And whose wouldn't, before such a spread of western delicacies? In fact, in the foreword and preface, there is a great smacking of eastern and even British lips at these choice morsels which, alas, seem to set so poorly on gardeners' stomachs this side of the Rockies.

While no eastern gardener worth his salt will fail to try his hand at these western things, it looks, nevertheless, as though Nature had drawn upon the gardening world certain lines of longitude which are as inexorable as those of latitude, and which no mere expedients of acidity or alkalinity can erase.

P. J. VAN MELLE.

Much About House Plants

GARDENING INDOORS. F. F. Rockwell and Esther C. Grayson. 201 pages, index, photographs and drawings. Macmillan, New York, 1937. $2.50.

"Gardening Indoors" by F. F. Rockwell, with well selected examples of window gardens by Esther C. Grayson, is another most helpful contribution to this phase of gardening.

It would seem that no one could fail to be successful in having such a garden if all the practical directions are followed which are given in this book.

More and more, the artistic use of plant materials suitable to the difficult conditions of heated houses and apartments makes this book of use to the amateur, and those who have the vision of beauty before them, but who become discouraged by the difficulties of its attainment, will be grateful to the authors.

MAUD RICHEY SEABURY.

Authority on Herbs

HERBS AND HERB GARDENING. Eleanour Sinclair Rohde. 206 pages, index, drawings and photographs. Macmillan, New York, 1937. $3.

Having in my collection seven of Miss Rohde's many books on herbs, both in and out of print, I am reveling in her recent book, "Herbs and Herb Gardening." The jacket, repeated in the frontispiece, both in colors, is a delight to the eye; the fourteen halftones scattered through the book show lovely spots of herb-gardens in England, helpful in suggesting effective grouping of plants and valuable to the newcomer to herb gardens in learning the height and spread of plants unfamiliar to him. Again, the thirty-one line cuts have made me recommend the book to several correspondents bewildered by the plants that have shot up in their gardens as the result of sowing a packet of mixed herb seeds. Not knowing one herb from another, the new herb gardeners are helpless, and I have found this to be the only moderately priced book containing so many representations of the herbs accurately enough executed as to enable identification. The two planting diagrams indicate a beautiful herb garden for extensive grounds, but to me somewhat too elaborate for beginners to undertake.

Miss Rohde speaks in the preface of her treatment of the use of herbs for decorative effect in the flower garden—a feature which is very dear to my own heart. Innumerable are the joys of growing herbs for the sheer beauty of them, as well as for their practical uses in cooking, in medicines, and for sweet-smelling bags and sachets. However, in the suburbs of our great cities, few people have space to give wholly to an herb garden; but the herbs, as Miss Rohde points out, may be introduced most delightfully among the bright showy flowers.

The names of so many herbs are familiar to us because of old associations with our childhood or from literature of romance—rosemary, lavender, sage, bergamot, thyme, marjoram. To each of these Miss Rohde has devoted a whole chapter, telling of ancient lore and legend which still clings to it, describing the several varieties, and advising somewhat about the peculiar cultural needs, this from an English viewpoint, but generally applicable in this country. One chapter is given to the practical culinary herbs, one to the taller herbs with which we may back our garden borders, a chapter to the bitter herbs and one to those used in medicine and magic. Just a few recipes are found in the last chapter.

There are a few inaccuracies in quoting source and reference. Miss Rohde strangely credits (page 73) to Lawson's "Country Housewife's Garden" the division of the garden into two parts, as she has previously done in "The Story of the Garden," although in her work, "The Old English Gardening Books," she cites Richard Surflet's translation of "Maison Rustique" as the source. The Lawson book makes no such division of the garden. Then (page 9) there is a quotation about the elves' preparing the seats of honor at Windsor Castle. It comes from "Merry Wives of Windsor," V-5. 59-60, but Miss Rohde ascribes it to "Midsummer Night's Dream." An even less important misquotation is that from John Josselyn's "New England's Rarities," concerning anise being "eaten with a fly." Like many another writer on herbs, Miss Rhode incorrectly quotes this (page 135) "of a fly." It has always been a puzzling statement.

But the charm of the book lies in its varied appeal, the happy recall of memories of grandmother's herb garden, the practical directions for growing herbs, the identification of varieties, the vast amount of legend. Any reader of the book somehow feels that it must have been written just for him.

ROSETTA E. CLARKSON.

A Significant Book on Ferns

GUIDE TO EASTERN FERNS. Edgar T. Wherry. 220 pages, index, drawings, half-tone frontispiece. Science Press, Lancaster, Pa., 1937. $1.

There have been so many books on ferns in the last few years that one would hardly think there could be room for another. This pocket-size manual, however, will be not only of distinct reference and field use for students in the region covered (the Middle Atlantic States) but also worth careful examination by the general student and by the gardener as well. Apart from a simple glossary there is no introductory section on the habits and structure of ferns; consequently the book is hardly suitable for the beginner. For anyone with an elementary knowledge it gives in clear and concise form the historical features, habitat, and range of the species of true ferns, climbing, flowering, and water ferns, grape-ferns, club-mosses, and horsetails for the region covered. The line drawings are good, though not distinguished.

The descriptions seem to include all the essential points of identification, which this reviewer has not found hitherto in any one volume. Such points of distinction, for instance, as the segments of *Onoclea* being opposite and those of *Lorinseria* alternate, or the blackish spores of *Athyrium asplenioides* as contrasted with the yellow-brown spores of *A. angustum,* are the type of information most helpful to students.

The discussion of habitat includes the acid-alkaline reaction, and the author stresses the importance of this fact in his excellent concluding remarks on fern cultivation, adding a classified listing of species suited to various types of soil.

An interesting contribution is the selection of common names. False "local" names and colorless personal names are disregarded. The changes from Massachusetts Fern to Bog Fern, from Virginia Chain Fern to Giant Chain Fern, from Goldie's Fern to Giant Woodfern, and from Boott's Fern to Glandular Swamp-fern should be heartily endorsed. The less usual common names given are simple and appropriate. Daisyleaf Grape-fern is obvious, exact, and therefore

memorable, yet it does not appear in other fern books; it is safe to say that the name *Botrychium matricariaefolium* means little to the non-botanist. *B. lanceolatum* has always seemed a misnomer: the sterile section is not lance-shaped; the name Triangle Grapefern given here is more descriptive than the old Lance-leaved Grapefern.

Notable is the full discussion of *Cystopteris fragilis;* variety *mackayi* being designated as Upland Brittle Fern, and variety *protrusa* as Lowland Brittle Fern —the latter more common in the Central Eastern States. The frequent confusion of forms of the Brittle Fern with the Blunt-lobed Woodsia is clarified.

It is surprising to discover *Dennstaedtia* grouped with the brackens. If the frond-margin of *Dennstaedtia* is reflexed over the sori, this is hardly noticeable, at least as compared with the reflexed margins of *Adiantum, Pellaea,* and *Pteridium. Dennstaedtia,* having cup-shaped indusia, or partial indusia, seems to me better placed with *Woodsia, Onoclea,* and *Cystopteris.*

D. T. WALDEN.

On the Rules of Nomenclature

Furtado, C. X. A commentary on the laws of botanical nomenclature. The Gardens' Bulletin, Straits Settlements. **9:** 223-284. 1937. The nomenclature of types. **9:** 285-309. 1937.

The current revision of the International Rules of Nomenclature was published in 1935. Already objections to some of their provisions have been raised, the general tenor of which is that the Rules do not always lead to stabilization of names. C. X. Furtado, of the Botanic Gardens at Singapore, has recently published a sixty-page criticism of the Rules, in which he offers little or no objection to the principles along which they are formulated, but points out numerous cases of insufficiency, of ambiguity, and of equivocation which tend to interfere with their proper use and application. He also offers many suggestions for the improvement of the Rules, not by any change in their underlying principles, but by refinements in the method of treating the more abstruse nomenclatural problems. In the same journal, Furtado also discusses in detail the nature and significance of the various categories of type specimens.

H. A. GLEASON.

Current Literature At a Glance*

By Carol H. Woodward

History. When J. E. Spingarn writes on "Henry Winthrop Sargent and the Early History of Landscape Gardening and Ornamental Horticulture in Dutchess County, New York," he is presenting a virtual background to the history of landscape architecture in America.

The 35-page reprint from the 1937 Year Book of the Dutchess County Historical Society tells the story not only of the Sargent who, with his 22-acre estate, "Wodenethe," furnished inspiration to many, including his cousin, Charles Sprague Sargent, in his development of the Arnold Arboretum. He gives histories also of Andrew Jackson Downing, whose "Landscape Gardening" went into innumerable editions, influencing horticulture for two or more generations; of André Parmentier, who did important work in America, including laying out the grounds of Dr. David Hosack's estate, "Hyde Park"; and, briefly, of Dr. Hosack himself, of Hans Jacob Ehlers, H. H. Hunnewell, and, among others, of Frederick Law Olmsted, disciple of A. J. Downing and the first man to call himself professionally a "landscape architect." Speaking of Downing, Parmentier, Ehlers, and Sargent, Mr. Spingarn says, " . . . on the soil of Dutchess County they found a golden opportunity, and it was partly or wholly their work here that spread their influence throughout the country."

Several delightful pages are devoted to excerpts from the diary of Dutchess County's first professional gardener, an escaped Negro slave named James Brown, who kept a day-by-day account of his work and other events at the garden of the Verplanck family at Mount Gulian from 1829 to 1866.

Plants Without Soil. Recording a lecture which he had given, J. W. Shive of Rutgers University tells in the January *Bulletin of the Horticultural Society of New York* how plants can be grown in

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

sand or water supplied with proper nutrient solutions. He gives two tested formulas for feeding plants thus raised, and says that sand is preferable to water as the supporting medium.

Berried Shrubs. "These are the Berries" says Margaret McKenny in the title of an article in the January *American Home*. She names about 75 shrubs, vines, and trees whose fruit will attract the birds to one's property, and tells what to plant in damp spots and dry, at the seashore, in shade, and under average conditions.

Writing in the *Bulletin of the Garden Club of America* in the same month, Esther D. Waterman tabulates 38 varieties of decorative berried shrubs which grow on the estate of Mrs. Hugh Auchincloss in Connecticut.

Another list of plants to attract birds appears in Madison Cooper's *Gardening Magazine* for February.

Delphiniums. Writing of "Better Delphiniums" in *Country Gentleman* for January, Harry R. O'Brien describes some of the newest and most successful hybrids for American gardens. In January also, Leon H. Leonian writes on "Delphinium Species" in the *Gardeners' Chronicle of America,* speaking particularly of those which are best adapted for hybridizing.

Pioneers. Four Europeans and four Americans figure in the brief history of the pioneers in research on virus diseases, written by Melville T. Cook for the *Scientific Monthly,* where it appears in January. "The next few years," Dr. Cook concludes, "will undoubtedly bring forth a large number of important papers and may change our views on the viruses and probably on the characters of the simplest forms of life."

Notes, News, and Comment

Education. At the invitation of the President of Dillard University, T. H. Everett went to New Orleans in January to survey the situation relating to the education of Negro students as gardeners and, upon his return, to outline a curriculum for the training of professional gardeners at Dillard. On his way back to New York Mr. Everett stopped in St. Louis and Chicago to visit important conservatories there.

Publication. The American Rock Garden Society plans in the near future to commence publication of a series of plant studies, which will include illustrations, descriptions, and cultural notes on rock garden plants of outstanding interest. T. H. Everett is chairman of the committee on publication, on which E. J. Alexander, P. J. van Melle, Montague Free, Carl English, and J. G. Esson have been asked to serve.

From South America. A short-wave radio message received the middle of January from Dr. A. C. Smith by Mrs. Smith through an amateur operator told of his expected return to New York from the South American jungles probably some time in May. While others in the American Museum Terry-Holden Expedition, of which he is a member, are now believed to be making their slow way back to Georgetown, British Guiana, Dr. Smith plans several additional trips into unexplored territory with John Melville, who has long been a resident in the remote interior of Brazil, before he returns to The New York Botanical Garden.

Torrey Club. Raymond H. Torrey, a member of the Board of Managers of The New York Botanical Garden, has been elected president of the Torrey Botanical Club for 1938, succeeding Dr. John Hendley Barnhart. Dr. Harold N. Moldenke continues as treasurer and Miss Clyde Chandler has been elected recording secretary for the year. Dr. William J. Robbins has been elected to the council of the club.

Books. Supplementing the Saturday afternoon lectures at the Garden, a special display of books is now being arranged each week in the library by Miss Elizabeth Hall. Literature pertaining to the subject of each lecture is placed on a rack in the reading room the afternoon preceding the program and is kept there through the following week until late Friday. Members of the audience and others are invited to consult the library's large collections on subjects in which they are interested.

THE NEW YORK BOTANICAL GARDEN

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, semi-annual, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twentieth volume. Subscription price, $10 a volume (two years). Not offered in exchange. Free to members of the Garden.

Journal of The New York Botanical Garden, monthly, containing notes, news and non-technical articles. Subscription, $1 a year; single copies 10 cents. Free to members of the Garden. Now in its thirty-ninth volume.

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DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

MARCH, 1938

BEGONIA "PRESIDENT CARNOT" Cover Photograph by Fleda Griffith

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BEGONIAS

Among the functions of a Botanical Garden is the assembling of complete collections of plants, essentially for comparative study but also frequently for their beauty when on public display.

Begonias are a group which serve this dual purpose admirably, and at The New York Botanical Garden there is one of the finest collections of fibrous-rooted begonias in America. In the glasshouse which is given over to these plants, there are nearly 300 species and varieties. While there is always bloom in this house, during February and March the plants taken over to Conservatory Range No. 1 make an outstanding floral display.

The nomenclature of this group is much confused, and considerable work has been done at the Garden in recent years in untangling the mass of names that surround many of the types. Literature in many languages is being traced and a complete record of all references to begonias is being steadily compiled.

The collection of living plants has been built up partly by gift, partly by exchange. Seeds of wild species collected in Mexico and India have been presented to the Garden and additional seeds have been sent by other botanical gardens. Plants have come from growers, sometimes in return for surplus material, sometimes in appreciation for the identification of species submitted to the Botanical Garden for naming. In 1934 a large number of plants were brought from Kew and other gardens in England, greatly enriching the collection. The Garden co-operates with begonia growers far and near, and is always glad to receive new material in exchange.

There is a complete herbarium collection based on the plants being grown at the Garden.

From the living collections surplus plants are distributed to members, and it is expected that larger numbers of named varieties will be available in the future.

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Hardy Azaleas for Beauty Of Form and Color In the Garden

By Clement G. Bowers

GARDEN effects of considerable beauty may be obtained with deciduous hardy azaleas, yet in relatively few American gardens have they been utilized to their full capacity. This is especially true of our native American species, which are too seldom seen and then are most frequently used in woodland or naturalistic settings which, however excellent, do not begin to demonstrate their full range of adaptability as dooryard shrubs and garden flowers.

One sees beautiful effects with azaleas at our large flower shows, but the species exhibited are often of such tender nature—as the Kurume azaleas, the various greenhouse azaleas and their allies—that comparable results may be secured outdoors only in mild climates or in the most protected situations, being quite out of the realm of possibility for New England and central New York. Occasionally, however, some of the hardier kinds are used. Recently there have appeared some very fine exhibits of hardy azaleas in spring flower shows at New York and Boston and particularly in the small but distinguished Cornell flower show at Ithaca where such wildlings as *Rhododendron roseum* and *R. calendulaceum* have proved quite as effective and almost as floriferous as the more tender sorts.

In the usual flower show material the colors are commonly restricted to the white-pink-rose-crimson-purple range, although some very fine reds of the *R. Kaempferi* sort are sometimes included. This is because such azaleas usually belong to the so-called

Obtusum subseries, originating in Japan and China, which have no such colors as yellow, orange, scarlet or true salmon-pink. Many are semi-evergreen, or quite evergreen when grown indoors or in milder climates. The habit of many of these azaleas is rather compact, which makes them useful as garden shrubs in localities where they will grow. Moreover, they are easily propagated from cuttings and easily forced under glass. These are prime reasons why the Japanese and greenhouse azaleas make good material for flower shows, especially since some of the native azaleas are difficult to force.

There is no denying the fact that azaleas of the Obtusum subseries are possessed of rare horticultural merit, and I shall later mention some of those that are adaptable out-of-doors, but I prefer here to discuss the particular azaleas which are of greatest usefulness in cold gardens. Such azaleas comprise all the native American species, except those rather tender sorts originating in the Lower South and along the Pacific Coast. Included also are the various Mollis azaleas, the Ghent hybrids and *Rhododendron japonicum*, besides a few outlying sorts of miscellaneous character. Generally, they belong to that botanical subdivision collectively called the section Pentanthera because they have only five stamens, but more recently designated as the Luteum subseries.

Some of these hardy deciduous azaleas are among the showiest of all flowering shrubs. Included in the group are forms of nearly all the colors to be found in the Obtusum subseries, with more besides. Their colors range from pure white through cream, lemon, yellow, orange, scarlet, purple, rose and pink. The Ghent hybrids alone encompass this range, while several other sorts of equal or greater hardiness bring in different types of flowers and plants. There are double and semi-double forms of the native American species as well as among clonal varieties of Ghent and Mollis azaleas. Again, the flowers may be fragrant or scentless, early or late, large or small. Among the hybrids, one may find all sorts of intermediate color tones, combinations and patterns, and some of the "art" shades are particularly attractive. Crimson and purple, however, are not present to any extent, nor are their values, when found, the same as in the other subseries.

The American species are generally coarser in habit than those of the Obtusum subseries, originating in Asia, and the plants are frequently taller. Under proper culture, however, these hardy

sorts will become almost as floriferous as the others, being quite covered with flowers at blooming time. It should be noted, too, that where in certain Obtusum species (such as *R. Kaempferi* and the clonal variety called Amoena[1]) the red flower colors fade badly after exposure to the sun, in the American azaleas and the Ghent hybrids certain rose, red and scarlet forms of flowers do not fade even after severe exposure to full sunlight. Whether this is generally true of the red flowers in this, the Luteum subseries, I do not know, but I can bear witness to the fact that a Ghent azalea in my collection, having a flower color not unlike that of *R. Kaempferi* (although far from being identical) retained its brilliancy of pigmentation without turning either brownish or purple until the corollas dropped from the plant. Good plants of *R. roseum* are similarly free from color distortion until the flowers wither, and I think I am correct in saying that no faded flowers were observed in the wild collection of the newly-found scarlet

[1] Certain names such as Amoena and Daviesii are not italicized here since such plants are merely horticultural varieties (clones), hence are not entitled to Latin terminations.—C.G.B.

Hardy azaleas combined with rhododendrons along a drive at Highland Park, Rochester, N. Y.

flame azalea of Kentucky. Yellows, however, will sometimes fade to white; this is true of the hybrid known as Daviesii, which is cream when the buds open and soon becomes white with a pattern of golden yellow on the upper lobe.

Perhaps one reason why we do not pay more attention to our native azaleas as floricultural subjects is because we think of them in terms of their wild naturalistic habit and environment, failing to perceive that these native shrubs are amenable to horticultural treatment of the most sophisticated sort, under which they may become quite different objects from the often half-starved and scraggly wildlings of our woods. I do not imply that they are not beautiful in nature or that the naturalistic style is not a good use for them. But the plants one sees in the wild are often growing under conditions of severe competition and hence are seldom the equal of the vigorous, floriferous specimens that can be produced under the best conditions of garden culture.

Few flowering shrubs are the equal of the hardy deciduous azaleas for general purposes, such as dooryard planting, borders, shrub gardens, specimens and points of interest where color is needed. The fact that they seldom become overgrown and the further fact that they possess an interesting branching habit when not in leaf makes them of great potential usefulness in landscape work apart from their display of color at flowering time. Moreover, they are showy over a fairly long season. While no one plant will remain in bloom longer than a few days, one may select varieties in such a way that, in a collection of several species, some plant will be in flower at almost any time between the last of April and the middle of July. Of course, these plants are not so generally "foolproof" as Van Houtte's spiraea, privet, barberry and other exceedingly hardy shrubs that are not at all fastidious about their site and culture. But I have previously explained[2] that the hardy deciduous azaleas are not too difficult to grow provided one plants them correctly and uses wise choice in the matters of site and species.

The deciduous azaleas are exceedingly beautiful when set against an evergreen background or intermingled with evergreen shrubs. They are entirely suitable and sometimes very effective when interplanted with true rhododendrons, some of which may

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[2] Journ. N. Y. Bot. Gard. **38**: 73-78. 1937. **39**: 1-5. 1938.

bloom at the same time. Yellow azaleas, blooming at the same time as Catawba rhododendrons, often complement the lilac-colored flowers of the latter and impart a sparkling color note to an otherwise somber effect, while a few rhododendrons among a bed of brilliantly colored azaleas often add a depth and richness of color that serves to enhance the effectiveness of the azalea display. At other times, best results may be secured by the separate use of species or varieties for definite purposes. Most azaleas have great luminosity in their flower colors, due probably to the size, form and texture of the flower which serves to catch the light rays and refract them as through miniature stained glass windows. Because of the pleasing pattern of their naked branches, azaleas are superior to rhododendrons in winter when they are seen in silhouette, and are therefore more suitable to use against a light background when such is necessary. They are good against dark backgrounds, too, and are effective when interplanted with dwarfish conifers. In the woodland, also, azaleas are effective, especially if touched here and there by rays of sunlight which make their flowers glow against the dark shadows of the trees. A little patch of wood may be rendered glorious by the mere addition of a simple little path and half a dozen azalea plants. When azaleas can get just enough light and sunshine to make them bloom well, they always appear delightfully at home among the trees.

A situation often overlooked is the great beauty of a garden of turf and woody plants carefully designed, and the ease and economy with which such a planting may be maintained. Not all woody plants are effective. But azaleas and certain other flowering trees and shrubs are as showy as any herbaceous plants while in bloom and have the added advantage of furnishing an excellent green background for the rest of the garden when the flowers are gone, which is something of which few herbaceous plants are capable. Gardens of this general plan although they seldom include azaleas such as we are describing, are characteristic of the old estates along the James River in Virginia and those excellent Colonial gardens now so popularly acclaimed at Williamsburg. Gardens of similar but more modest plan are to be found among the old estates of the North. In southern gardens of this type there are many trees, and hedges enclose small areas of turf and flowering plants or shrubs. Now, azaleas were probably not

used in authentic Colonial gardens, because these plants were not cultivated in America in the early days, but the point I wish to bring out here is the potential usefulness of azaleas in semi-shaded, hedged-in gardens of woody plant materials similar in design to these beautiful gardens of Colonial days. With the rise of popular interest in traditional American culture now being engendered by the Williamsburg Restoration and similar movements, plus the inherent beauty of this type of garden, which combines a maximum of beauty with a minimum of labor, it is conceivable that a revival of interest in shady gardens and woody plant materials may occur. This brings to our attention the fact that azaleas are plants *par excellence* for such usage. One or several flowering azalea bushes, set within one of the hedged parterres of such a garden, partly shaded with overhanging trees and arbors, would be an effective sight indeed. In full sun part of the day, shaded at other times and always protected from sweeping winds, an azalea would find good environmental conditions in such a garden. With such a background, a few flowering plants may have all the beauty and effectiveness of an elaborate display, without the trouble and expense of a large collection of plants.

At the present time in this country it is almost necessary to buy the Pentanthera azaleas as seedlings or specimens collected from the wild. Among the azaleas of the Obtusum subseries, which are easily propagated from cuttings, one can find many clones or "named" varieties, some of which are greatly superior to ordinary seedlings. But in the Luteum subseries, plants of named varieties are available only in grafted material and this, also, is exceedingly scarce. It is to be hoped that methods will be applied to the propagation of these fine plants, such as the Ghent hybrids, which may be more satisfactory than grafting and which will also permit the rapid multiplication of superior forms. Some progress along these lines is being reported through the use of plant hormones, but the practical gardener must spend a long time in waiting before he will be able to secure everything he wants. At the present moment, therefore, only the more fortunate may have collections of named hybrids, double forms and certain special colors.

Excellent plants of various species are being raised commercially by certain nurserymen. Although one cannot always find

the items he most desires, such as *Rhododendron japonicum,* one may often pick up excellent seedling plants of the best species. Many of these are virtually as good as the best hybrids, but they are grown in mixed lots, subject to considerable variation, and the safest way to insure satisfaction is to visit a nursery during blooming time and actually pick out the plants you want. This is especially true of the species most subject to variation, such as those having yellow or orange flowers (*R. calendulaceum* and *R. japonicum*), as well as seedlings from hybrid parentage such as the Ghent or Mollis azaleas. Variation is not so great within most of the native American species and one is reasonably safe in assuming that seedlings of *R. roseum, R. arborescens,* and *R. Vascyi* as well as the Japanese *R. Kaempferi* and others, will be reasonably true to type, although subject to minor fluctuations, if ordered by mail. Then, too, many nurserymen and collectors of native plants classify their stock, so that one can often order a plant of the yellow form of the Flame Azalea, or an orange form, or a white form of *R. Vascyi,* or a similar specified sort, and be sure to get it. The equivalents of many Ghent and Mollis hybrids will be found among the mixed seedlings of the species I have mentioned.

Below I am describing the hardy species of azalea (*Rhododendron*) which are available and relatively inexpensive and which I consider the most worthy of use in northern gardens. Since the best varieties among the Ghent and Mollis hybrids are difficult to get, and since their merits, for the most part, still remain to be more widely demonstrated in this country, I am not emphasizing them in the following descriptions.

Rhododendron roseum, the Mayflower Azalea or Downy Pinxterbloom, is one of the very best for general purposes and for hardiness. It is widely distributed, usually inland and on hilltops from New England to the Carolinas, and has for many years been considered a variety of *R. nudiflorum.* In the trade, it frequently masquerades under the name of *R. canescens,* which is a tender and inferior species from Georgia and Florida, but the plants are really *R. roseum* from the Piedmont region of Virginia. This is how the name Piedmont Azalea became erroneously attached to the Florida species. Intermediate forms between *R. roseum* and *R. nudiflorum* are not uncommon in the wild, but typical forms differ in that *R. roseum* is of a brighter, clearer pink color and

has a strong spicy fragrance of cloves, while *R. nudiflorum* has merely an insipid sweet odor and is horticulturally very inferior. There are other distinguishing characters, but these are of most horticultural importance. *R. roseum* blooms just before Decoration Day and makes an excellent dooryard and garden plant.

Rhododendron calendulaceum is the brilliant Flame Azalea. Typically light orange in color, it has forms ranging from lemon-yellow to orange-vermilion, and now a bright scarlet form has been found. The latter was reported in 1936 from Kentucky by Dr. W. H. Camp of The New York Botanical Garden and is now in cultivation, although it may be some time before plants are on the market. This form has deep red flowers, ranging from orange-vermilion to deep scarlet and most of the plants bear their flowers in round, rhododendron-like trusses of 20 to 30 flowers each, with long exserted stamens and pistil. This form of inflorescence is not uncommon in the species, but the bright scintillating color is decidedly a new "break" and one which appears to the writer, who has seen it in the wild, as a form of genuine horticultural possibilities. Other scarlet forms of this species are in cultivation, but I have seen none so intensely pigmented as this. At the same time, we should not discount the value of the yellow and orange forms, which constitute some of the most gorgeous azaleas in the world. *R. calendulacea* is perfectly hardy in sub-zero climates and blooms about the middle of June at New York and Boston. This is, in part, the ancestor of the Ghent hybrids, *R. gandavense*.

Rhododendron arborescens is an excellent white-flowered species, scented like heliotrope and blooming in mid-June. *R. viscosum* also has white flowers, smaller but very fragrant of cloves. It is the latest azalea to bloom, coming in July. At that time the new foliage tends to cover the flowers, so that the species is not so showy as *R. arborescens* nor so valuable in the garden, except that it comes very late and imparts a delightful fragrance over a wide area. I have seen it in bloom as late as the first of August.

Rhododendron atlanticum is a dwarf species from the Coastal Plain of Virginia and the Carolinas, which, however, is fairly hardy at New York and Boston. It is usually only eighteen inches tall and it spreads by underground runners or stolons. This spreading character is not a detriment, however, and makes the species useful as a ground cover. It blooms late in May and appears in both white and pink forms, the white form being the

most useful, in my opinion. Possessing abundant flowers with a pleasant rose-like scent, this species deserves to be much better known.

Rhododendron Vaseyi, the earliest to bloom among the American azaleas, is regarded as one of the choicest azaleas in the world. Its flowers differ in shape from those of the others here described and are of a delightful apple-blossom-pink color. *R. Vaseyi,* native in North Carolina, blooms in New York in early May and is perhaps the most vigorous grower of all. Plants are easily obtainable in the trade.

Rhododendron canadense, the Rhodora, also blooms early, but is less attractive. It bears peculiarly shaped, slender, lilac flowers and has a certain beauty of its own, but is the least showy of any of our species.

Rhododendron japonicum is certainly one of the most potentially useful species. It comes from Japan and, like the Flame Azalea, has great variation, ranging from the pure yellow form,

Rhododendron nudiflorum, native to woodlands and hilltops in the north and east, under cultivation produces even more abundant flowers than are to be seen here in the wild.

Photograph by L. W. Bi

var. *aureum*, to forms that are salmon and salmon-rose. The flowers are larger than those of any American azalea, being two to three inches across, and in the darker forms are frequently brick-red. Among the plants from a mixed batch of seedlings one can find color types nearly as good as the best Mollis hybrids. A hybrid named Miss Louisa Hunnewell was originated some years ago. It is doubtful if the original clonal variety by that name is anywhere in existence now, but seedling progeny, being in reality seedlings of *R. japonicum* and *R. molle*, are on the market under the name of Louisa Hunnewell. These are worthy of cultivation as good azalea seedlings, but are probably no more valuable than ordinary *japonicum* seedlings, which they actually are. *R. japonicum* is one of the very hardy azaleas.

Rhododendron molle from China is so closely allied to *R. japonicum* as to be nearly identical, but is considered of doubtful hardiness. Probably both of these species require abundant summer moisture, and probably both of them have had a part in the so-called Mollis hybrids, sometimes called *R. Kosterianum*, which include some excellent hardy azaleas with large flowers. The colors are mainly yellow, orange, and brick-red, and the plants of both species and hybrids bloom at New York about mid-May.

Rhododendron mucronulatum is not truly an azalea, but is a deciduous rhododendron from Korea. It is notable for its very early bloom which sometimes comes as early as the first of April at New York City. Though it is quite hardy, this feature makes it susceptible to injury by spring frosts. The flowers are of bright magenta, not unattractive when blooming by themselves in early spring, but not to be mixed with other colors.

Rhododendron Schlippenbachii, the Royal Azalea, appears to be hardy to 20 degrees below zero, but of doubtful hardiness in colder climes. Where it will grow well it is a beautiful, large flowered azalea of blush-pink color and distinctive foliage. Experience indicates, however, that it is somewhat fastidious about its environment in a way that is not yet entirely clear.

Rhododendron pentaphyllum appears to be a beautiful and promising large-flowered, early, rose-colored azalea for Long Island and places of similar mildness, but of doubtful hardiness northward. It blooms about the 20th of April. It is very rare here and not on the market.

We now come to the azaleas belonging to the Obtusum sub-

series. We shall spend little time with these, not being particularly concerned with them in this article, since the majority are not reliably hardy north of the environs of New York City or along the New England Coast in sheltered places. It should be noted that scores of varieties in this class of azaleas reach their limits of hardiness somewhere between Philadelphia and Boston. In such circumstances, local conditions mean everything and one may not be too arbitrary in what he says. It should be constantly borne in mind by persons in colder places that varieties advertised as "reliably hardy" by nurserymen in this area may not prove to be hardy in situations a few degrees colder than those found at the nursery where they are grown. Azaleas in this class are extensively propagated and sold under clonal names, because they are easy to multiply by cuttings and make attractive garden subjects in climates where they will survive.

Rhododendron Kaempferi is one of the very few azaleas in this class that will grow outdoors at Boston and is the hardiest of its group. It is one of the most valuable garden azaleas we have and is perfectly hardy to —15° F., but is absolutely tender below this temperature and will kill to the ground at —20° F. if sustained for any length of time. This species is quite variable, but is generally characterized by its distinctive bright red flowers which have a salmon tinge and which are apt to fade upon exposure to the sunlight. Every garden that is not too cold should have *R. Kaempferi.* There are now some races of hybrids on the market. It is doubtful if they are as hardy as this species, but several are of undisputed merit. The so-called Malvatica hybrids belong in this group.

Rhododendron mucronatum, the Snow Azalea, often miscalled "Azalea Indica Alba" and "Azalea ledifolia," is a splendid white-flowered species from Japan, about four feet high, with partly evergreen foliage. It blooms in mid-May and is lovely about New York City, but cannot be recommended for regions farther north. It has a number of varieties under special names, some of which have distinctive color patterns in rose or purple.

Rhododendron poukhanense is somewhat hardy at Boston, but, in the opinion of many gardeners, is not worth growing, because of its dull lilac color. It has a double form, called the Yodogawa Azalea, which is rather handsome and does well at The New York Botanical Garden, but which is of doubtful hardiness northward.

Rhododendron indicum comes from Japan, not India, and is represented by several forms which will grow outdoors at New York City, but are probably tender northward. One of these is a low plant with flowers of deep rose color which is called J. T. Lovett. Another is a handsome dwarf form with very double flowers about the color of *R. Kaempferi*, useful for rock gardens, called variety *balsaminaeflorum*.

Rhododendron pulchrum is probably tender at New York, but a supposed variety, *Maxwellii*, is a splendid dwarfish plant with large flowers of deep rose, hardy at Boston with some protection.

Rhododendron obtusum is represented at New York by the familiar varieties Amoena and Hinodegiri and the less hardy Kurume azaleas. Small of flower and compact of habit, these azaleas are very beautiful and are favorites at flower shows, but cannot be recommended north of New York City except in very warm spots.

There are many more varieties which might be mentioned, but since we are here interested mainly in azaleas of reliable hardiness and easy obtainment, it is time to bring this list to an end.

Bark and Buds to Identify Some Native Trees In Winter

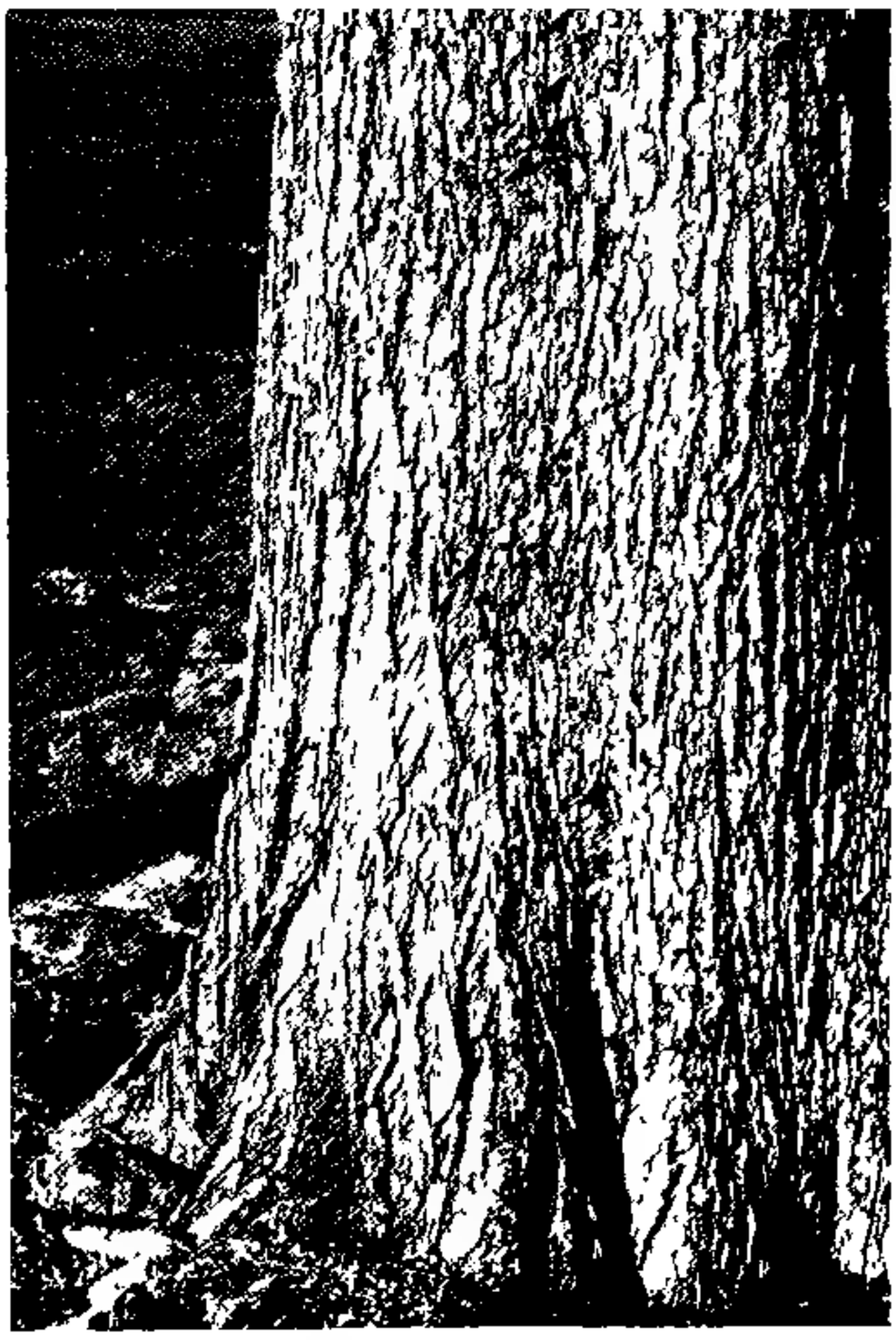
By E. J. Alexander

LEAVES are by no means essential to the nature student who wishes to know and recognize trees. While in summer one's tendency is to glance at a leaf to find a determining mark, this method is reliable only for generalizations, for oak leaves have a confusing variety of outline on a single tree, the foliage of different hickory species has a distressing sameness, and an elm can easily be mistaken for something else if only a leaf is seen.

Even the flowers of trees, while to the botanist they are a positive clue to a species, can not be counted on by the average nature student, because their life is so short compared to the fifty weeks or more in which a tree must be identified by other means. For in winter, even if a tree has not grown to fit the silhouette ascribed to it by books, there are undeniable marks of identification. These lie in the dormant buds, leaf-scars, and the bark.

In the December number of this magazine, Dr. Forman T. McLean told how to identify trees in winter by their outlines and branching habits. The same fifteen trees, all of which are common natives in the northeastern states, are now to be described in more detailed winter condition, with illustrations of the bark of each and of the twigs showing the winter buds. Only a portion of the trees will be treated in this issue of the Journal; the remainder will appear next month.

All of the buds are shown magnified exactly three times, while the pictures of the bark were all taken at approximately the same distance (about eight feet) from each tree. The photographs were made by Miss Fleda Griffith, Staff Photographer, with the assistance of Miss Maizie Milland.—C.H.W.



American Elm (*Ulmus americana*). Rivaling the sugar-maple for first position as a botanical landmark of the New England scene, this most graceful of trees, with true feminine beauty in its form, is without peer as America's supreme contribution to treedom. Every inch a lady, a solitary specimen in perfect form immediately dominates its surroundings whatever they be. Its gray bark, longitudinally fissured into irregular, flat-topped ridges which are firm or somewhat scaly, is an outstanding characteristic which makes identification easy even in the forest where only the trunk is visible. A distinctive additional character may be found in a cross-section of the bark, which is internally stratified by alternating whitish and dark brown layers. The leaf-buds are ovoid-conical, light reddish brown, smooth and shining and appressed to the reddish brown or yellowish brown twigs which are smooth or slightly downy. The terminal bud is usually bent at an angle to the twig. The obovoid flower buds, which are much larger and taper at the base, are usually below the end of the twig. They are easily distinguished against the sky even when out of reach.

Basswood (*Tilia americana*). Among the statelier native trees the basswood or linden ranks high for, though when in the open it forms a broad rounded tree, in the forest it runs up a tall straight trunk which branches only high above.

On young trees the dark gray bark is somewhat smooth or with a few furrows dividing it into flat-topped ridges, but these ridges become more numerous and more round-topped with increasing age. The very regularity and evenness of these ridges is their identifying mark. The twigs are smooth, usually red or red-brown and shining, covered with a thin silvery skin which easily shreds off. The buds are bright red, oblique, with two or three smooth and shining scales showing on the outside. Viewed against the sky, the twigs and smaller branches are seen to be arranged in an arc, from the outer periphery of which the smaller twigs are given off at a tangent, the whole being spread horizontally. The tough and fibrous inner bark cannot be broken, but must be cut or ripped loose in long strips. This character may be easily tested by trying to break a twig. The American Indians obtained from the basswood fibre for weaving and other utility purposes, which made this one of their most important economic trees. In fact, the name basswood is said to have been originally bastwood, because of the many uses of the fibrous bast.

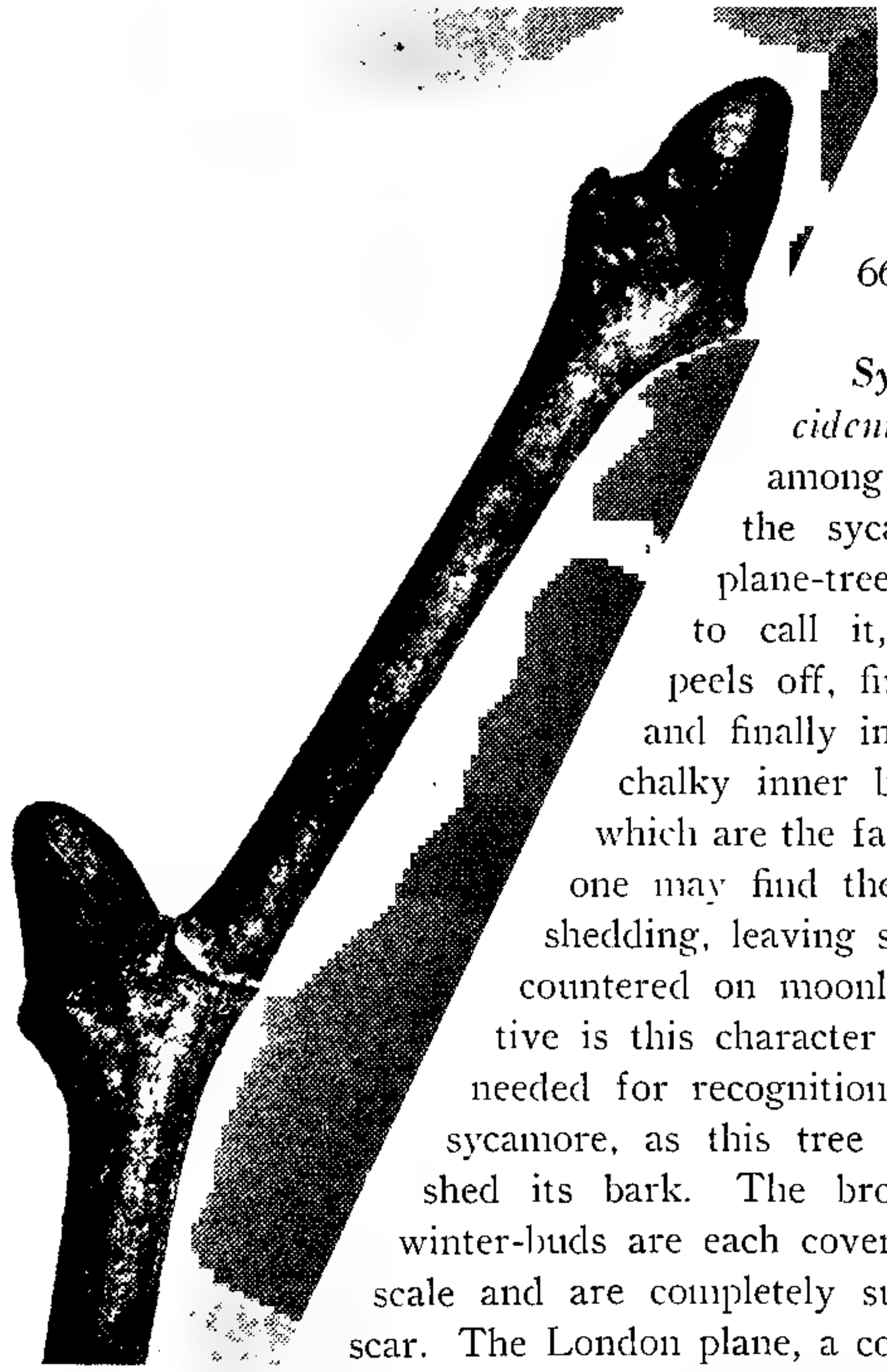
Basswood

Sugar Maple (*Acer saccharum*). Most loved and cherished for the memories it arouses is the sugar maple, whose rounded outline is such a familiar feature of the landscape in the northeast. Its value for timber and for its sap, from which maple syrup and sugar are made, as well as its ability for wresting a foothold from the rocky ribs of the New England countryside, have won for it such honor and respect as few trees have obtained. As for identification, only a glance is needed at the opposite, small, slender, sharp-pointed and many-scaled winter buds; and if further confirmation is desired, there is the manner of furrowing of the brownish gray bark, with the peeled-back edges of the ridges giving the trunk a ploughed appearance. No more is necessary to ascertain its identity.

At a distance the sugar maple might be confused with the Norway or sycamore maple, but these two trees have evenly furrowed bark with rounded ridges; their twigs are much stouter, and the ovoid buds—brown on the Norway and green on the sycamore maple –are fewer in number.

Silver-Maple (*Acer saccharinum*). Earliest of American trees to flower, and most rapidly growing, though short-lived, the silver maple is probably unique in its position. The first downward, then upward sweep of its branches is usually sure identification, but even then it is easily confused with the red maple, which it also resembles in its gray, somewhat scaly bark. The bark of the silver maple, however, is a bit more loose-appearing, more brownish, and its winter-buds are more brown and usually more numerous at each node. The bark of the youngest twigs is an orange-brown as opposed to the red of the red maple. When the accompanying photograph was taken around the 23rd of February, the flower buds of the silver maples at the Botanical Garden had burst so completely that an impression of their winter condition could not be obtained. Those shown in the photograph, only slightly opened, were gathered in Poughkeepsie, some seventy miles farther north.

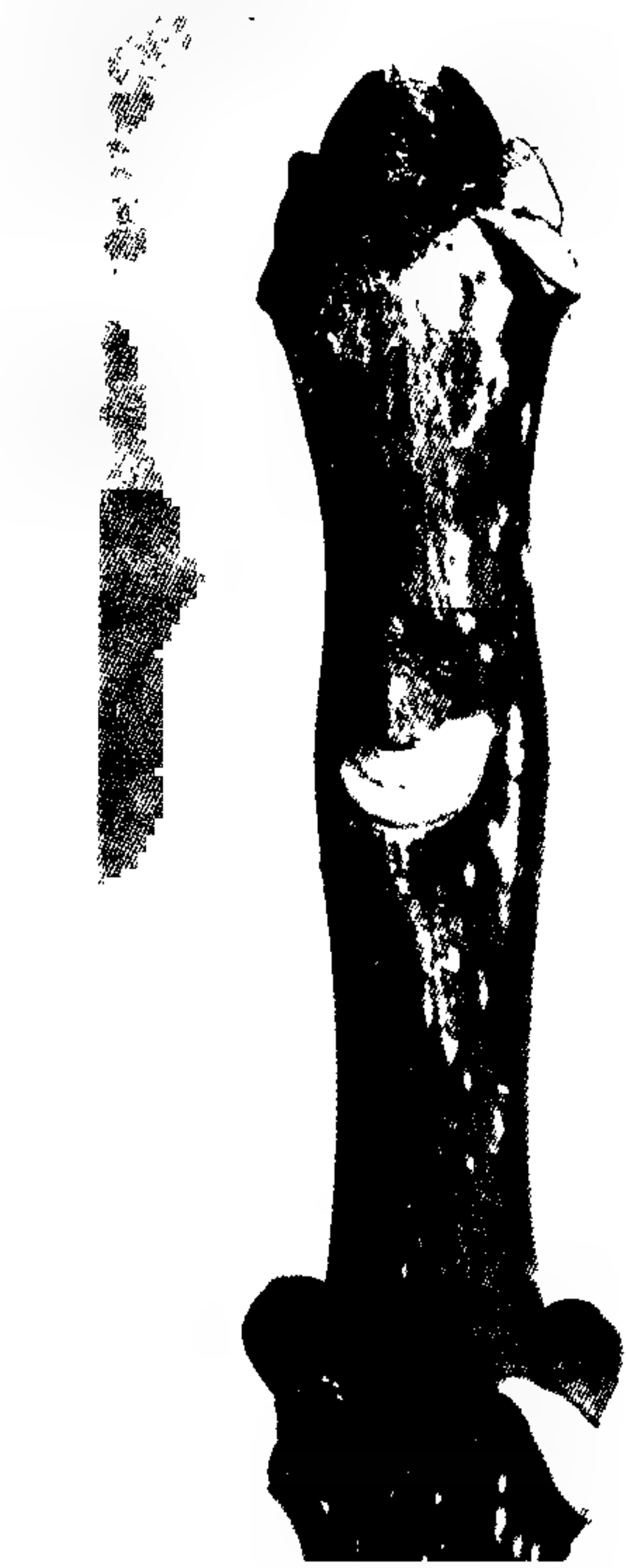
If the flower buds of the silver maple are dissected it will be found that the flowers have a nearly united cuplike corolla, whereas the flowers of the red maple have separate petals.



Sycamore (*Platanus occidentalis*). There are goblins among trees. Bear witness to the sycamore, buttonwood, or plane-tree, whichever you choose to call it, whose inelastic bark peels off, first in irregular patches and finally in entirety, exposing the chalky inner bark. In river-bottoms, which are the favored home of this tree, one may find the bark in all stages of shedding, leaving stark spectres to be encountered on moonless nights. So distinctive is this character that it is the only one needed for recognition of the buttonwood or sycamore, as this tree is never too young to shed its bark. The broad-based and rounded winter-buds are each covered by a single cap-like scale and are completely surrounded by the leaf-scar. The London plane, a commonly cultivated tree, is similar in appearance but has more wide-spreading branches, buds which are more pointed, and seed-balls which occur mostly more than one to a stalk. In the native tree the seed-balls are always solitary.

The portion of the bark of the sycamore that remains on the tree is dark brown and is broken into thin small scales rather regular in form.

White Ash (*Fraxinus americana*). Since the ashes and maples are our only common native trees with opposite branching, no confusion need ever arise as to their identity. The ashes have rather stubby, black-downy winter buds with the outer pair of scales somewhat spreading, and large raised leaf-scars, while the maples have smooth buds with appressed scales and small leaf-scars. As is characteristic with trees of opposite branching habit, each pair of buds is always at right-angles to the pair above and below. The narrow close furrows of the gray bark of the white ash, which run at irregular intervals, forming diamond-shaped hollows, are so distinctive that one scarcely needs to examine the very stubby, black velvet winter buds to recognize this tree. The other eastern ashes have more shallowly and irregularly ridged bark as well as longer, more pointed winter buds. The black ash, for instance, has rather dark gray shallowly fissured and very scaly bark and is strictly a swamp tree. Its buds are blunt and granular-appearing, while our other highland species (known as the red or green ash) has downy twigs and smooth, more pointed buds.



Shagbark Hickory (*Carya ovata*). Most distinctive among our native trees is the shagbark hickory, which may always be greeted as an old friend whenever it is met, for the long, upwardly shagging strips of bark which cover the trunk unmistakably spell its name. The buds are equally characteristic, for they are large and ovoid with yellowish wool, and the loose outer scales are ovate with long stalk-like tips. Like the ends of the twigs, the outer scales are covered with blackish wool.

The other hickories of our region may be told by their non-scaling, rigid and furrowed bark, as well as by the different forms of their winter buds.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Design or History?

THE PRACTICAL BOOK OF GARDEN STRUCTURE AND DESIGN. Harold Donaldson Eberlein and Cortland Van Dyke Hubbard. 232 pages. 231 illustrations. J. P. Lippincott, Philadelphia, 1937. $5.

The real purpose of the book, "Garden Structure and Design," is somewhat confusing to me.

There seems to be a considerable amount of history rewritten, and while it is in an attractive simple style I cannot see quite its place in a book of this type, except that it may be used for contrast.

Also one finds the pictures puzzling. There seems to be a mixture of historical subjects and present-day gardens that one can hardly say are copies of the same style. If the writers are planning to contrast French, English, and Italian ideas with our own, it seems rather unfortunate, for the average gardener is not much concerned with such matters, which are generally left to the professional landscape architect. The history is anything but complete, but one would hardly expect a comprehensive history in such a book. Even what there is seems somewhat scattered.

The writers have tried to put too much in a limited space and have not instructed us very completely on any one subject. For example, the chapter on Rock Gardens seems very incomplete and simply tells people what is fit and unfit for that type of garden. Take also, for example, the material on City Gardens and Roof Gardens. The principles involved in roof garden work are hardly touched in the chapter except with reference to certain parts of the gardens in Elements of the Composition. I doubt very much whether any amateur gardener would be able to carry out fully the roof garden suggestions and really know clearly what he was doing from descriptions in the book. Very little is said about soil for the roof garden, contamination of soil by gas and dust, the effect of gas and dust on plants, the limited amount of sun in most roof gardens, types of plants that will survive in the roof garden, what one may expect about the length of life of such plants, and many other problems that come to the gardener when a roof garden is anticipated.

If the book is to be a historical work it should stick to history; if a guide to structure and design it should stick to structure and design. If it is to concern cultural methods let them be handled in a simple honest manner. The book is confusing. There are many illustrations that are very beautiful, though one has to twist the big volume in three directions from page to page in order to see them, and some of the writing is very pleasing, but I should like to see it rearranged.

HUGH FINDLAY.

From a Dirt Gardener

AS ONE GARDENER TO ANOTHER. Lucy M. Ellis. 279 pages, illustrated with drawings. Thomas Y. Crowell, New York, 1937. $2.50.

This book is aptly named, for Mrs. Ellis evidently is a real dirt gardener, rejoicing in imparting what she knows to other gardeners who are not so fortunate as to have been able to experiment in three "active" gardens and one "passive" one, embracing three zones of the United States and one of Canada. She has owned none of these gardens but feels at least partly responsible for any "crimes against nature she may commit"—to quote her own words. This reviewer too has always held that even if one owns the land, one is responsible for any deformations in its use.

In addition to the author's practical knowledge, there are glimpses into the benefits derived from gardening and into the intangible charm of the life led by gardeners, when they are able to penetrate, even superficially, into the mysteries

of earth, birds, flowers and trees. Mrs. Ellis has done all this naturally, with humor and without sentimentality. She knows her English, touches upon origins, ends her book with appended simple planting tables in two zones (east and west), gives some plant histories, and knows her colors, speaking of cyanic and xanthic groups apparently without reference to her dictionary.

One wonders how she can use so much of her wisdom and experience on gardens she doesn't own, but one feels that perhaps she realizes how ephemeral everything is and has snatched what she can from the unstable future of satisfaction in her hobby.

This reviewer will profit from various ideas—sowing annuals and perennials on the same dates (as in the Berkshires, at least, if you sow seeds of perennials in June, they might not be ready before frost); covering difficult plants with more earth early in the season to stimulate root strength before dividing; and shooting seeds with a pea-shooter up to a high ledge otherwise inaccessible.

The chapter on garden furniture will amuse Mrs. Ellis' readers, even though it might be somewhat discouraging to the trade.

"No courage, no garden" is her motto when she analyzes the pests and fungi.

This is a book of gardening written as one would like to write to express one's own thoughts and experiences.

HELEN SUZETTE DE GERSDORFF.

Hormones

SYMPOSIUM ON HORMONES. Sigma Xi Lectures for 1936-37. Ohio State University. Illustrated; indexed only to title. Reprint from Ohio Jour. Sci. **37**: 315-463. 1937. (Obtainable from Dr. W. C. Fernelius, Dept. of Chemistry, Ohio State Univ., Columbus, Ohio. $1.00.)

This publication is a series of ten papers given in a symposium on hormones sponsored by the Ohio chapter of Sigma Xi. Although eight are concerned with animal hormones, the two leading papers —"The Growth Hormones Found in Plants" by George S. Avery and "Responses of Plants to Hormone-like Substances" by P. W. Zimmerman—are of particular interest to botanical students.

W. H. CAMP.

Current Literature At a Glance*

By Carol H. Woodw

Exploring. Greater horticultural us native plants and the development f them of new garden forms is urged Ira N. Gabrielson, Chief of the Un States Bureau of Biological Survey an article, "Exploring at Home," in March *Country Gentleman.* The au cites the selection and breeding don the past with such native plants as as and phloxes, and points to the possi ties latent in the violas, pentstemons, others.

Dry Ice. Transplanting of trees on expectedly mild winter days with the of dry ice to keep the earth ball in is described in *Parks and Recreation* February by Robert E. Everly, I Superintendent at Glencoe, Ill. W the method has not yet been perfecte has been found practical, Mr. Everly s for hardwood trees, especially if the of the earth ball is increased so tha may be encrusted with a frozen l without injury to the roots within.

Judges. An ardent plea for flower s judges who understand the type of hibit they are asked to evaluate is tained in an article entitled "Flower rangement" by Mrs. James A. Vaug in the January Bulletin of the Ga Club of America. Pleading for a plified schedule of flower show class "a schedule which stresses beauty ra than petty regulations and which ca read without reference to the dictiona Mrs. Vaughan concludes: "The law that a man should be tried by a jur his peers. Is it too much to ask the s privilege for the poor exhibitor?"

Ground Covers. In *The Amer Nurseryman* for January 1, L. C. Cl wick of Ohio State University gives results of three years' trials of 32 ferent plants suitable for ground co

Soil. As the introduction to a cussion of whether it is expedient t troduce special micro-organisms into Selman A. Waksman of the New Je Agricultural Experiment Station out the principles of soil microbiology *Soil Conservation* for January.

* All publications mentioned here—and others—may be found in the Library of Botanical Garden, in the Museum Buildin

Lichens. *Westchester Countryside,* a quarterly publication of the Westchester County Conservation Association, contains in its winter issue a popular survey of lichens to be found in the region of New York. Raymond H. Torrey, the author, refers collectors and nature students to the extensive herbarium specimens and library material at The New York Botanical Garden.

Chromosomes. A popular account of the work of Dr. A. F. Blakeslee in treating plants with colchicin to produce mutations is given by J. Sydney Cates in *Country Gentleman* for February. Desiring but not daring to predict possibilities for the future, the author gives a brief background for the present experiments and shows a picture of a marigold with flowers treated by Doctors Nebel at Geneva in which the chromosome number was doubled. "Shuffling the Chromosomes" is the title of Mr. Cates' article.

Plant Novelties. Many new and interesting plants are described in the January *New Flora and Silva,* including some American natives, such as species of *Fothergilla,* which are still relatively new to Europeans. In addition, stories of plant exploration and descriptions of plants of horticultural value from foreign regions are among the worth while contents of this periodical.

Mycorrhiza. Reginald F. Forbes in the January *Scientific Monthly* gives a survey of present-day knowledge and current work being done in the study of mycorrhizae and their effect on the higher plants to the roots of which they are attached. He speaks especially of the experiments now in progress at the Allegheny Forest Experiment Station, a federal unit housed on the campus of the University of Pennsylvania.

Advisory Council Report

In presenting the annual report of the Advisory Council at the annual meeting of The New York Botanical Garden in January, Mrs. Elon Huntington Hooker, chairman, expressed the ardent hope of the group for a Members' Room at the Garden.

"We think it would be well," she said in part, "to have a room simply and attractively furnished in the Administration Building for the use of members of the Garden, and especially for the Advisory Council, where we may meet conveniently in small groups or larger numbers, and even serve tea when desirable."

Mrs. Hooker also told of the Council's desire to co-operate in the development of an officinal garden. "To have a large collection of herbs placed in an attractive design" is the idea expressed for the plan of the garden. Mrs. Mortimer J. Fox is chairman of the Council's officinal committee.

Last summer's changes in the perennial border of the Advisory Council, under the direction of Mrs. Ellen Shipman, were described by Mrs. Hooker. The path beside the border has been lowered, entrance steps and side-posts have been installed, and a hedge of yew has been planted opposite the perennial border.

The Advisory Council recently elected four new members, who became members also of the Corporation in January. They are: Mrs. James Barnes, Mrs. Moses W. Faitoute, Mrs. Clement Houghton, and Mrs. Richard deWolfe Brixey.

Besides Mrs. Hooker the officers of the Advisory Council are: Mrs Carl A. de Gersdorff, vice-chairman; Mrs. Nelson B. Williams, recording secretary; Mrs. Townsend Scudder, corresponding secretary; and Mrs. F. Leonard Kellogg, treasurer.

Notes, News, and Comment

Heredity. Before a special meeting arranged by the Torrey Botanical Club, Professor Dr. F. von Wettstein, Director of the Kaiser Wilhelm Institute for Biology at Berlin-Dahlem, spoke on "Some Problems of Heredity, Especially of Polyploidy in the Mosses" the evening of Feb. 15, at Schermerhorn Hall, Columbia University. Dr. von Wettstein spent some time at the Botanical Garden during his brief sojourn in New York.

From Ireland. Making an informal study of American horticulture, the Sixth Earl of Rosse was among the midwinter visitors at the Garden and was shown

several places of interest around New York by members of the staff. Lord Rosse, who resides at Birr Castle, is the proprietor of an estate of more than 25,000 acres in Kings County, southern Ireland, and is particularly interested in forestry.

Conference. At the monthly conference of the scientific staff and registered students of the Garden Feb. 9, Dr. B. O. Dodge spoke on "The Behavior of Lethals for Ascus Abortion in *Neurospora*" and Dr. F. J. Seaver on "Some Discomycete Problems." On Jan. 12 seven members of the staff reported on the Indianapolis meeting of the A.A.A.S.

Early Flowers. *Crocus Korolkowii,* habitually one of the earliest flowers to bloom in the Thompson Memorial Rock Garden, started to open this year on February 7, and was at its best around February 25. This was three weeks later than last year, when it was in full flower by Jan. 18. Freezing weather which arrived a few days later did not seem to damage the plants.

Crocus chrysantha variety Bowles Early was in bloom the last of February, as were also four species of *Galanthus*—*G. nivalis, G. plicatus, G. byzantinus,* and *G. Elwesii. Helleborus niger,* the Christmas rose, has been in continuous bloom since November, while *H. viridis* has been showing buds since Christmas. It was expected to open the early part of March.

Lectures. Members of the staff who have addressed outside audiences during the past few weeks include Dr. A. B. Stout, who spoke before the Plant Science Club at Yale University Feb. 14 on "Incompatibilities in Flowering Plants"; Dr. W. H. Camp, who addressed the Torrey Botanical Club Feb. 1 on his travels in Mexico, then in Ohio addressed two State University audiences Feb. 3, one on "Continental Drift and Plant Distribution" and one on "Winter in Oaxaca," followed on Feb. 5 by another lecture on Mexico before the Garden Club at Brewster, Ohio; and T. H. Everett, who spoke on "Plant Hunting in the Rockies" before the Flushing Garden Club Jan. 24, at Beekman Towers Jan. 27, before the Nassau County Horticultural Society Feb. 9, and before the Dutchess County Horticultural Society at Poughkeepsie March 2; on "Rock Gardens" before the Woman's Club of Scarsdale Feb. 2 the Thompson Memorial Rock Ga before the Connecticut Horticultural ciety at Greenwich Feb. 11, and "Plant Hunting in the Southern Ap chians" before the Hudson River Ga Club March 1.

Visitors. Among the botanists visited at the Garden during Febr were Professor Alexander Evans of University, who was consulting hep in the herbarium; Dr. Francis Dr also from Yale, selecting loan mat for his studies on the blue-green al Dr. Ruth Patrick, Curator of the I Microscopical Society at the Acaden Natural Sciences in Philadelphia, was studying the collection of diat and Joseph C. McDaniel, Assi Forest Ranger with the Tennessee V Authority, pursuing studies on prob of flower behavior and sterility in tion to breeding forest trees. Dr. Ir. Wiggins of Leland Stanford Jr. versity spent November at the Ga working on the flora of the Sor desert of northwestern Mexico.

Staff. Frederick Kavanagh, who ceived his master's degree from the versity of Missouri, has begun under Dr. William J. Robbins as T nical Assistant on the staff of Botanical Garden. He is tempor located in the laboratory of Dr. S Trelease at Columbia University.

Appointment. T. H. Everett has named an honorary director of the Ai can Begonia Society, headquarters which are at Long Beach, Calif.

Books. Among the books which recently been added to the librar Vol. I of "Virginia Trees" by Wi Harrison Lamb. Preceding a chec of species there are 95 pages of text, describing forest types, then the men of the Pine family.

Medal. At the monthly meeting o Horticultural Society of New Yor Feb. 16, The New York Botanical den was awarded a silver medal f collection of begonias displayed.

Azaleas. The three articles on az which Dr. Clement G. Bowers is cluding in this number of the Jou will be available from the Botanical den in booklet form at the nominal cl of 25 cents apiece.

THE NEW YORK BOTANICAL GARDEN

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The New York Botanical Garden was incorporated by a special act of the Legislature of the State of New York in 1891. The Act of Incorporation provides, among other things, for a self-perpetuating body of incorporators, who meet annually to elect members of the Board of Managers. They also elect new members of their own body, the present roster of which is given below.

The Advisory Council consists of 12 or more women who are elected by the Board. By custom, they are also elected to the Corporation. Their names are marked with an asterisk in the list below. Officers are: Mrs. Elon Huntington Hooker, Chairman; Mrs. Carl A. de Gersdorff, Vice-chairman; Mrs. Nelson B. Williams, Recording Secretary; Mrs. Townsend Scudder, Corresponding Secretary; and Mrs. F. Leonard Kellogg, Treasurer.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

APRIL, 1938

SPRING ALONG THE BRONX RIVER — Cover Photograph by Fleda Griffith

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MEDICINAL PLANTS

Since taxonomic research was first undertaken by the staff of The New York Botanical Garden some forty years ago, the institution has been concerned with plants of importance in medicine, and its collections include the sources of all of the well known drugs.

Dr. H. H. Rusby, who is to be awarded the Flückinger medal in Germany next month in recognition of his many years of productive research on medicinal plants, initiated the Garden's interest in this phase of botany, first by his early explorations in Bolivia, later by his studies of the plants he had collected there and by his building up of the Garden's large economic museum.

In recent years, some confusion has existed in the pharmacopeia, as it has been realized that the sources of many drugs were botanically unknown. Members of the Garden's staff have therefore given special attention to studying the pharmaceutical plants in their collections. Dr. A. C. Smith is now on a six-months' exploring trip in South America where he is collecting many plants believed of medicinal value. Last year, with B. A. Krukoff, he completed a study of the rotenone-yielding plants of that continent. Rotenone is fast becoming one of the most important insecticides. Dr. H. N. Moldenke, also working with Mr. Krukoff, who has brought back from South America hundreds of drug-plants, some heretofore unknown, is now preparing a study of plants used in making curare, the poisonous preparation used on arrow points by South American Indians. They and other members of the staff are also working on taxonomic studies of plants which are known or believed to have value in medicine, with the basic idea of placing the knowledge about them on a solid foundation of scientific exactness.

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The Passing of Doctor Small

By John Hendley Barnhart

WITH the death of Dr. Small, which occurred at his home, 301 East 207th Street, in the morning of the 20th of January, 1938, The New York Botanical Garden has lost one who was associated with its development from the beginning, and one whose long-continued taxonomic and floristic work has shed luster upon its name.

John Kunkel Small was of Pennsylvania-German stock and was born on the 31st of January, 1869, at Harrisburg, where he spent his early years. He never lost touch with his birthplace; in fact, it was not many years ago that the failure of a Harrisburg bank in which he was a large stockholder seriously depleted his private fortune.

In 1888 he entered Franklin and Marshall College at Lancaster, and soon gave evidence of his interest in that science to which he devoted the remainder of his life. He found a kindred spirit in one of his classmates, A. Arthur Heller, and together they scoured the country in the vicinity of Lancaster, and made more distant botanical excursions in each other's company. Both boys became professional botanists, but Heller, after many years of scientific activity, gave up his botanical work and retired to a farm at Chico, California, where he still lives.

During his sophomore year at college Small contributed to the "College Student," a Franklin and Marshall magazine, his first published paper, "Classification of plants endowed with the habit of sleep." In February, 1892, several months before graduation, he published in pamphlet form a "Preliminary list of the mosses of Lancaster County."

In January, 1890, he joined the Torrey Botanical Club of New York City, with which his name was to be intimately associated for nearly half a century. Before the end of the year 1890 he had made his first contribution to the pages of the club's Bulletin, some brief "Notes on *Asplenium pinnatifidum.*" This was the first of fifty-five of his papers that appeared in the Bulletin, the last in 1924. He was also a frequent contributor to Torreya from its establishment in 1901 until 1928.

During the summer of 1891, he and Heller undertook a botanical excursion to the mountains of western North Carolina, and upon their return published an account of the trip in the third volume of the Memoirs of the Torrey Botanical Club. This expedition to the Carolina mountains marked the beginning of his lifelong interest in the flora of the southeastern United States.

Upon graduation from Franklin and Marshall in 1892, he secured a fellowship in botany under the late Professor N. L. Britton at Columbia College, now Columbia University, and removed to New York City, where he lived for the rest of his life. Here he found congenial surroundings: excellent herbarium and library facilities, and association with a professor and fellow-students having interests similar to his own. He worked upon problems of taxonomy and floristics, and published his results from time to time in the Bulletin of the Torrey Botanical Club. Soon he was building up a reputation as a keen observer, a careful worker, and a convincing writer.

For the topic of his doctorate he chose the genus *Polygonum,* and this naturally took up most of his time; but he made repeated excursions into other fields, including important contributions to the knowledge of the genus *Oxalis* and the southern flora. His "Monograph of the North American species of *Polygonum*" appeared in 1895, and comprised 183 quarto pages and 84 plates. It constituted the first volume of the memoirs of the department of botany of Columbia College, and served as his thesis for the degree of doctor of philosophy. In the same year he was elected to membership in the American Association for the Advancement of Science.

For three years longer he remained at Columbia as curator of the herbarium, continuing his studies in his chosen fields. Among his many papers contributed to the pages of the Bulletin of the Torrey Club was a series of fourteen under the title, "Studies in

Photograph by Nation-wide News Service.

JOHN KUNKEL SMALL
1869 — 1938

the botany of the southeastern United States", and he was already gathering and arranging the materials for his monumental flora of that region. He also contributed the text of several families to Britton & Brown's "Illustrated Flora." It was during this period that he married Elizabeth Wheeler, who survives him, as do their four children, two sons and two daughters.

The New York Botanical Garden had been incorporated in 1891, the year before he came to New York, but throughout his six years at Columbia it was going through its preparatory stages: selecting a site, collecting funds, and erecting buildings. He was closely associated with Dr. Britton, the leader in this work, and was thus in touch with all that was being done. It was only natural, therefore, that when the staff of the Garden was at last organized, in 1898, his name figured in the list as curator of the museums. From that time he took an active part in building up the new institution, until it became one of the greatest botanic gardens in the world.

His administrative work in developing the scientific collections of the Garden consumed much of his time, although he had assistants in both museum and herbarium who could attend to many of the details. His heart, however, was in his studies of plants, and he formed the habit, continued through later years, of doing much of his studying and nearly all of his writing after hours, at home, often sitting up until the small hours of the morning. This had no visible effect upon his robust health, but may have shortened his life.

During his early years at the Garden, his prime interest was in the completion of his "Flora of the southeastern United States." There had been no professedly complete descriptive manual of the plants of this region since Chapman's "Flora", published in 1860 and only slightly revised at later dates. Small's studies added numerous species segregated from those recognized by Chapman, many described from collections that Chapman never saw, and a remarkable number of tropical forms from parts of Florida not previously explored. When the flora finally appeared, in 1903, it made a bulky volume of nearly fourteen hundred pages, and in spite of inevitable defects could be fairly characterized as a masterpiece. It confirmed at once the right of its author to a place among the foremost taxonomic botanists of his day.

This great flora, like nearly all of Small's books, was published by and at the expense of the author. The New York Botanical Garden had limited funds available for publication, and such funds were wholly absorbed by the regular series, such as the Bulletin, the Journal, the Memoirs, and North American Flora. It was therefore the settled policy of the Garden never to publish any books written by members of the staff, even though most of

them paid for themselves, and some showed a small profit. Therefore, except in the case of his last few books, which were handled by the Science Press, Dr. Small acted as his own publisher. This explanation is due his memory, as there were those who complained that his books should have been published by the Garden instead of by him. The Garden policy in this matter has been slightly modified within recent years.

It was in 1901 that "John K." first visited Florida, to see with his own eyes the remarkable plants that others were sending him, to rediscover plants found long before and not since collected, and to satisfy himself to what extent further exploration was needed. His eyes were opened. He revisited the state on a average more than once a year for the next thirty-five years, going back and forth through every part of it, even the most inaccessible areas. He lived to see many parts of Florida, inaccessible at the time of his earlier visits, become altogether too accessible to the ignorant destroyer of the works of nature, and to the vandal eager to replace nature's beauty by the crude "improvements" of man. And always, wherever he went in that wonderful state, he discovered new facts about its flora. The field seemed inexhaustible.

In the pages of this Journal he published fascinating accounts of many of his southern trips, some of them stopping short of Florida or extending along the Gulf Coast as far as Texas. But with the later years such accounts became fewer, partly because so many of his experiences were repetitions of earlier ones, partly because the pages of the Journal were needed for other matter. Of many of his later trips there is no printed record, and in the case of some of them he never, it is believed, prepared an account for the press. But his contributions to the Journal upon other topics were numerous; in some years, such as 1931 and 1933, one was printed in almost every number. One series related to the palms, another to the cacti, and another to the irises, all of the southern states; these three groups being among those to the knowledge of whose occurrence and distribution he had made the greatest contributions.

As has already been mentioned, he earned his degree of doctor of philosophy early in his career. His later degree, doctor of science, was an honorary one, conferred upon him by his alma mater, Franklin and Marshall College, in 1912. And in 1936 he was awarded, by the Alumni Association of the Graduate Schools

of Columbia University, an honorary scroll in recognition of his contributions to science as botanist, explorer, and author.

One of his discoveries in which he took great pride was the existence in southern Louisiana of an astonishing variety of native irises, unaccountably ignored by all local botanists and botanical visitors. They differed most strikingly in the color of their flowers, but there were corresponding characters in the shape and size of flowers, capsules, and seeds. In all, he and his associate, E. J. Alexander, described as new nearly ninety species in this group. Some botanists, prejudiced by a feeling that so many species could not have remained so long unknown, insist that these are but forms of a single very variable one, but he studied and knew them far better than his critics. Some of these irises have been exterminated in a wild state, but fortunately nearly or quite all of the forms are still growing in southern gardens. A curious fact is that although their natural habitat is in water or very wet places, they can be grown in much colder climates, but only if kept in very dry ground. They are permanently hardy as far north as New York, even in the Catskill Mountains.

Small's "Flora" of 1903, and the revised edition of 1913, were inconveniently large for ready reference—they were sometimes dubbed facetiously "Small's pocket flora"—and there was an insistent demand for a new and condensed edition. By a slight restriction of the range, a vigorous abridgement of the descriptions, and the omission of the ferns, he was able to reduce the size of the page and to insert at least one small text illustration of every genus; and the resultant "Manual of the southeastern flora", after long delay, made its appearance in 1933. Even this was a volume of nearly 1,600 pages, not well adapted to field use; it was, however, much smaller than the earlier flora, because printed on thinner paper.

In his later years he devoted more and more attention to the study of ferns and their allies. Some of his earlier papers were concerned with these plants, and in 1918 he published two diminutive books on the ferns of limited areas in southern Florida, but it was not until 1932 that the volume entitled "Ferns of Florida" made its appearance, with an illustration of every species described. Thereafter he had many more drawings of ferns prepared under his personal supervision, and his "Ferns of the vicinity of New York", issued in 1935, and his "Ferns of the

southeastern states", just off the press, are illustrated in the same manner. He also had all of the drawings finished for the illustration of at least one other fern book.

After nearly thirty-four years of active work as a member of the staff of the Garden, he was relieved of his administrative duties in 1932. This gave him more time to devote to the kind of study that had always most strongly appealed to him.

In spite of the wide reputation earned by his published writings and correspondence, Dr. Small was personally known to comparatively few. This was not due to diffidence on his part. He was a member of only a very few societies, and did not leave home to attend scientific meetings. He felt keenly—all too keenly—his shortcomings as a public speaker, and was never to be heard on the lecture platform or on botanical programs. He was wholly absorbed in his work, and took little interest in those whose work was not along similar lines. But to those whose interests were related to his own, he was not merely tolerant, but wholeheartedly cordial. And on his travels he made many friends among those with whom he had previously corresponded, or who were friends of his friends. These always wrote urging him to return, and if he found an opportunity to do so they greeted him with open arms.

Some scientists build their reputations upon quantity of output; this alone often inflates their reputations among their contemporaries, who are so busy with their own affairs that they do not take time for critical inspection. But when men of a later generation go carefully over the same ground, they find that the supposed bigwig was vastly overrated. Other men are so cautious that their literary output is small out of all proportion to the thorough nature of their investigations. John K. Small belonged in neither of these categories. The total of his published books and papers is unusually large, and he left many manuscripts, complete and incomplete. But his greatest weakness was a tendency to exaggeration for the sake of emphasis. Yet he was so careful in his work that few of his statements can be questioned, and future studies will serve only to confirm them.

Bark and Buds to Identify Some Native Trees in Winter

(*Continued from the March Journal*)

Black Oak (*Quercus velutina*). With the much-lamented passing of the American chestnut from the forest scene, the black oak has risen in value as a source of tannin, of which it possesses the highest percentage among deciduous trees. In general appearance it resembles both the red and scarlet oaks, but is most easily distinguished from them by its buds and bark. From both it may be readily told, on studying the bark, by the thick, deeply furrowed, but narrow and very rough-surfaced longitudinal ridges, which are further broken by irregular cross-ridges. Most distinctive, however, are the elongate-ovoid, sharp-pointed and five-angled buds on the black oak, the dark scales of which are covered with a dense dirty-white wool. The inner bark is dull orange-yellow. Probably the most clinching characteristic of all lies in the fact that the twigs when chewed taste bitter and impart a yellow color to the saliva. No other oak possesses this character.

Yellow Birch (*Betula lutea*). The frayed and shredded ends of the circularly peeling yellow bark render this beauty of northeastern forests a conspicuous means of identification. When growing in the open, the rounded form of growth is quite distinct among birches, but in the forest one must rely upon the yellow bark and the wintergreen taste of the twigs as well as the larger winter-buds to distinguish the yellow from the river birch. Its nearest relative, the black or cherry birch, also has the wintergreen flavor, but the bark is non-peeling and black, the winter-buds spread at a greater angle to the twigs, and the catkins are smooth, whereas those of the yellow birch are downy. In fruiting condition, the yellow birch is further distinguished by the proportionately broader cones. The leaf-buds at the right are enlarged three times.

Tulip-tree (*Liriodendron Tulipifera*). Loftiest of eastern trees and unmistakable in the majestic upsweep of its tall straight trunk is the tulip-tree or yellow poplar, the bark of which is marked by long, evenly furrowed ridges which run together at distant intervals. Though it is light gray when dry, the bark becomes brown when wet.

The smooth, reddish brown or purplish twigs are shiny when the bloom is rubbed off, and the flattened two-edged buds, coupled with the stipular scars which completely encircle the twigs, are an unfailing character in case of doubtful identity. The persistent cones of fruit which stand erect at the tips of the bare twigs are a further point of recognition on tulip-trees of flowering age.

The American species of tulip-tree having long been thought to be the sole remnant of its genus from bygone geological ages, it was a surprise when in 1901 the Chinese plant, which since its discovery in 1875 had been considered a variety of the American, was described by Sargent as a distinct species, *Liriodendron chinense*. This added another link to a long chain of parallel species in the flora of eastern Asia and eastern North America.

Sour-gum (*Nyssa sylvatica*). A most distinctive tree is the sour-gum or tupelo, with the rather straight trunk continuing up through the flat-topped crown, and with the branches in horizontally layered form. The dark gray bark, deeply furrowed and cross-ridged into roughly elongated hexagonal blocks, is easily recognized in the woods. While sour-gum trees in exposed situations often are dwarfed in height, they always maintain their characteristic form, including what seems to be an excessive number of twigs.

The smooth, reddish brown twigs are of two types. On shoots or on young trees there are fast-growing ones which have several leaf-scars crowded near the end, whereas on trees of flowering age, the twigs and branches bear numerous short, slow-growing spurs which themselves are crowded with leaf-scars. These spurs usually bear the flowers. The twig in the illustration is of the fast-growing type.

The ovoid, slightly lopsided, shiny brown buds are somewhat blunt, the lateral ones spreading and raised on cushion-like bases. A vertical slit through a twig discloses thin woody partitions in the pith, another unfailing identification mark.

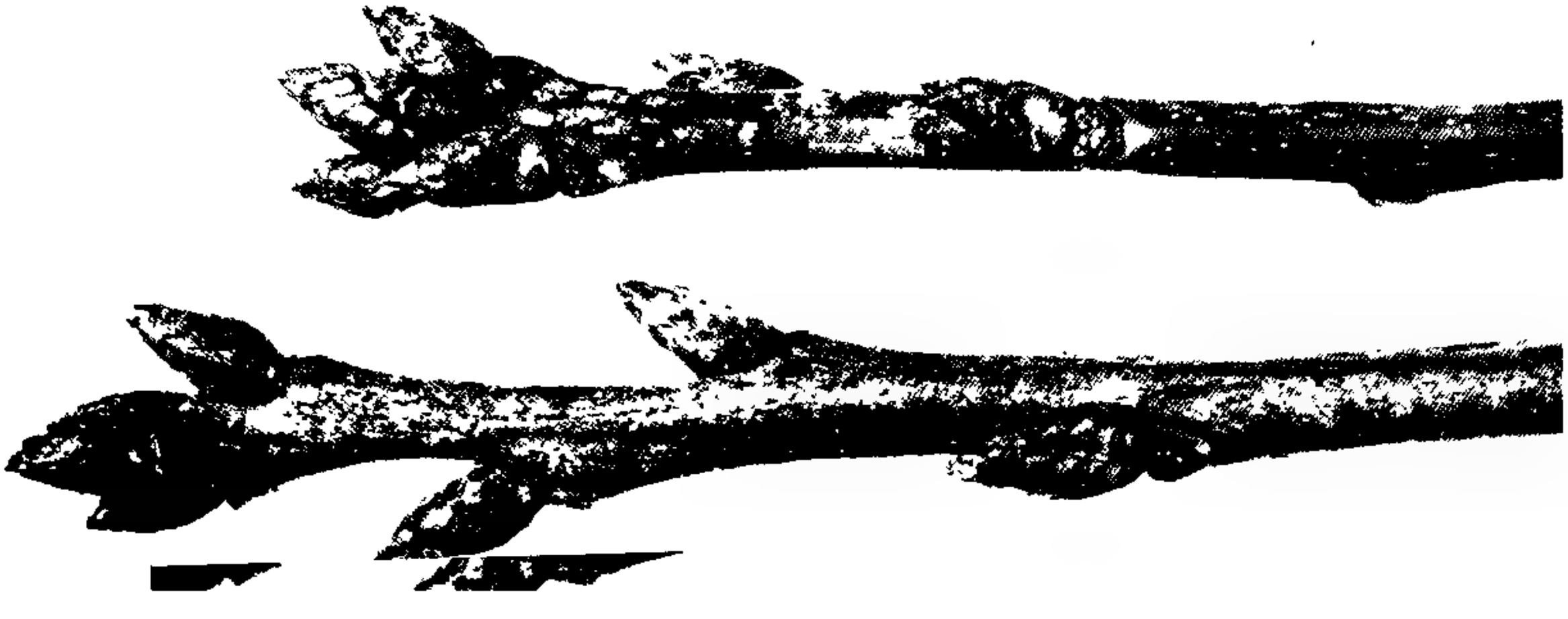
White Oak (*Quercus alba*). Mightiest of the northern oaks in girth and spread of its branches, the white oak is at once the most common of them as well as the one most valued for timber. The light gray bark, shallowly fissured into long irregular thin scales which flake off easily, is not a safe character for identification, as four other oaks are similar enough to be confused with it. The scrub chestnut oak, by reason of its shrubby growth, more slender twigs and smaller buds is easily ruled out. The chinquapin oak has somewhat darker bark, more upright branches, and more pointed buds. The post oak has greenish-downy twigs and smaller, more rounded buds. The swamp white oak also has smaller and rounder buds, and the young twigs have peeling bark.

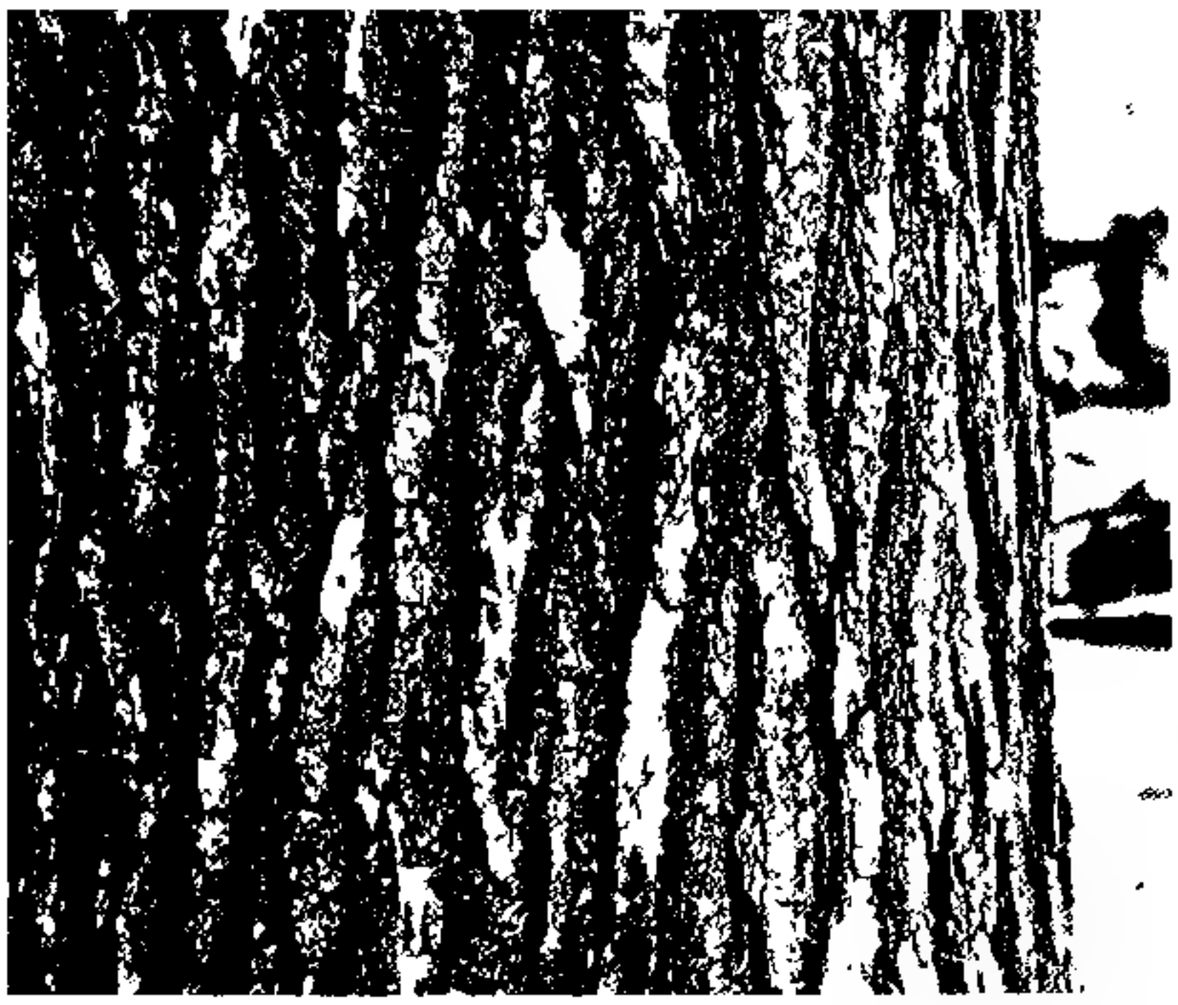
The large light brown winter buds of the white oak are ovoid-conical in outline, very blunt, yet not completely rounded at the tip. As in other oaks, they are clustered at the ends of the twigs and alternately arranged below. The twigs are reddish, orange, or, in lowland regions near the coast, gray in color.

Pin Oak (*Quercus palustris*). Among such a highly masculine group of trees as the oaks, it is surprising when one of them is accused of effeminacy. In the slender twigs of the pin oak and in the drooping sweep of its lower branches there is undeniably grace, but surely no femininity. The straightness with which the trunk usually continues into the crown makes the pin oak suitable for avenue planting, whereas other oaks are too inclined to spreading form. Its characteristically close, narrow, and shallowly furrowed bark, which on younger trees is smooth, is unmistakable.

The slender twigs, greenish beneath, and the small, sharply pointed, smooth, dull brown buds confirm one's recognition of the pin oak.

The clustering of the buds at the ends of the twigs is a mark of identity for all oaks, as well as the characteristic by which they may be distinguished from their close relatives, the chestnuts, which have solitary terminal buds but otherwise are quite similar in appearance.





Sweet-gum (*Liquidambar Styraciflua*). The bark of the trunk and old branches of the sweet-gum is gray-brown, fissured into broad, somewhat flaky ridges, but on the upper portion of the tree and the younger branches it is rather smooth and silver-gray, or in saplings entirely so. There is much variance in the twigs, depending upon their position on the tree, the young ones being smooth and orange brown, the old ones gray with knobby surface. Frequently (though not always) the branches and twigs develop broad corky wings. The shining, brown, ovoid and pointed buds with thick hard scales and the star shape of the pith when seen in a cross-section of the twigs are the surest marks of identification.

Sassafras (*Sassafras variifolium*). Who, among those not raised in the city, does not have fond memories of childhood stirred by the mention of sassafras, the bark of whose roots furnished the material for sassafras tea, used by Indian and White alike as a spring tonic? This eastern tree is possessed of one unfailing character in the odor of all parts when bruised or broken. The angular, bunchy manner of branching of the smooth green twigs, frequently with lateral branches of the first season's growth surpassing the main axis, is a unique feature, as also are the ovoid green buds with brown tips. In the trunk, rather reddish brown, deep, coarse furrows with horizontal cracks running in part around the trunk, divide the ridges into oblong inverted Y or V shapes.

The three types of twigs on a sweet-gum. At right, a young twig enlarged three times.

Modern Study of Plants In Relation To Education

By E. J. Salisbury

The following article, which was Professor Salisbury's presidential address before the British Association, is reprinted here by kind permission of the author and of the editor of Nature (London), where it appeared in the issues of October 16 and 23, 1937. The British style of spelling has been retained wherever it differs from the American.

IF WE cast our minds back on the general attitude adopted towards botany in the latter part of the eighteenth century, we cannot but be struck by the almost apologetic phraseology of its votaries and the curious grounds upon which they rationalized its pursuit. Rousseau, for example, described botany as a study of pure curiosity that has no other real use than that which a thinking, sensible being may deduce from the observation of Nature and the wonders of the universe. I venture to think that many otherwise educated people today would express similar sentiments, though in more modern and probably less complimentary language.

The teaching of our subject has been in no small degree to blame for the widespread misconceptions as to its aims and content. For long regarded as a harmless and elegant occupation for the female sex, botany only survived as a study of practical utility because of the continued necessity for medical practitioners to acquire some knowledge of materia medica. How perfunctory was much of this teaching is indicated in that charming book, "Leaves from the Life of a Country Doctor", where the late C. B. Gunn describes how as a medical student in 1878 "the botany class gave me a 'scunner' at the subject which has lasted ever since."

The old technological significance for medicine has long since gone, but a newer and vastly more important significance remains, both cultural and vocational, which has rarely been stated, let alone stressed. Despite the vastly enlarged content of botanical knowledge since those days, the general conception of botany has remained much what it was then. The high value of botany as an educational subject and indeed its absolute necessity in any system of real cultural development are aspects which botanists have failed to present and emphasize.

The protagonists of compulsory Greek and Latin of the last century valued very highly, and rightly so, the cultural content

which a study of the humanities could provide. It is easy for us to be wise after the event, but now that the dust of that controversy has cleared away we can see that failure to apprehend that there are other approaches to the same mental salvation led to an unfortunate insistence upon the means rather than upon the end.

But whilst scientific workers justly claim that cultural value is the monopoly of no one subject and that those brought up in the classical tradition may be as much philistines as any man of science, it is undoubtedly true that the immense cultural potentialities of scientific thought have too often been neglected for the sake of mere erudition. There is a general tendency for university teaching to become more and more vocational as the specialized demands of occupations become increasingly exacting. Thus, not only do technological aspects grow more obtrusive, especially in the final courses of certain subjects, but also there is a trend, in the direction of this change, making its influence felt, further and further back in the student's training, so that we find, for example, certain sections of the medical profession demanding that the preliminary education should have a more direct bearing on the future occupation of the student, despite the fact that this can only be accomplished at the expense of their general education and culture. With the long course of training which most professions today require and the financial strain that this often involves upon parents, one cannot but sympathize in the wish to provide some relief, but if this is to be accomplished without detriment to the ultimate standing of the professions themselves, it can only be by an increased concentration on the more general aspects of culture in the schools. So far as biology is concerned, there is a widespread recognition for the need of greater attention to training in observation in the schools, allied to what may be termed the scientific study of natural history. Too much attention in this as in other subjects is paid to the acquisition of mere information, especially if recent, too little to the principles which are involved.

This is not intended as a stricture upon the teachers, since, with our present system, earlier and earlier in the students' career they are striving to achieve a dual objective—the training which should be their chief concern, and preparation for university examinations at a stage in mental development which cannot adequately appreciate the educational content of the curricula. Thus the stu-

dent who has taken the intermediate examination from school is often handicapped in comparison with those who would appear to be starting their university career in a less advanced stage.

Just as the increased demand for material things facilitated the replacement of the products of the craftsman by mass production of machine-made articles, so, too, the rapid increase of population following the Industrial Revolution inevitably led to something analogous to mass production in the education of children and the training of teachers.

Many there are who blame the examination system, which, however, with all its faults, if rightly used, is in reality a fairly efficient sieve for separation where large numbers are involved. But the examination machine is often expected to effect a grading of the human material with which it deals that can only be attained by more individual methods. As a consequence, undue importance is attached to examination results and a wrong emphasis is often laid on their significance. This leads to a premium being placed on mere erudition, and so subjects are liable to be taught not as living realities but, in the forceful phraseology used by Winston Churchill in one of his novels, "Knowledge is presented as a corpse which bit by bit we painfully dissect."

Furthermore, our educational methods are, I fear, too often divided in their allegiance; on one hand we aim at the provision of a liberal culture which will make for the greatest happiness of the individual, considered in terms of mental contentment and an abiding resource in later life; whilst on the other hand we aim at the equipment of the student for the earning of his daily bread to ensure bodily comfort. We are not sufficiently trustful that the provision of the former is, to employ the expressive northern phraseology, the "gainest way" to the latter end, and so we adopt a sort of mental squint, which permits neither of the clear vision of the full beauty of integrated knowledge nor even of keeping our eyes on the main chance. It is no more possible in education than in ethics to serve both God and Mammon. It is not merely good education but the apotheosis of worldly wisdom to seek first the cultural background and to believe that the vocational proficiency will be added unto you.

The universities cannot be held blameless for the lack of appreciation by the general public of the implications of our subject. May I, in this connexion, quote a passage from an American report on university education which loses none of its cogency on

this side of the Atlantic: "Appointing authorities too often place undue stress on specialization, instead of placing adequate emphasis on scholarly background, versatility of intellectual interest and general culture."

Whilst activity and distinction in research is a necessary qualification of the teacher, the capacity to impart knowledge to others is no less essential. Too often in the selection for university posts, aptitude as a teacher, which should be a first consideration, is entirely subordinated to distinction as an investigator. No one, it is true, can be an inspiring teacher who does not possess intellectual initiative and who is not engaged in a creative pursuit, but most of us have suffered at one time or another from the investigator "whose thoughts are too full for words." Furthermore, we must avoid the undue sacrifice of breadth for depth for other reasons.

The accumulation of data and the provision of information bear much the same relation to the advancement of knowledge as artificial fertilizers to crop production. Just as our fertilizers must be properly balanced, so, too, our information must be so correlated and concerted that ignorance in one department does not become the limiting factor in our utilization of extensive data in others. In these days of extreme and increasing specialization, such correlation of effort is becoming more and more important, and it is to the universities, old and young alike, that we must look for the maintenance of that contact and synthesis which is essential to real progress. In particular, I should like to urge that the time has come when the curriculum required of those proceeding to a university degree in science should be reconsidered. It is, in the present state of knowledge, as much an anachronism that a student should be able to proceed to a degree in chemistry having no knowledge of biology as that he should proceed to a degree in botany with a mere smattering of either physics or chemistry. Anyone who aspires to a degree in science should in my opinion have an adequate appreciation of the principles of physics, chemistry, mathematics, especially as regards statistical methods and probability theory, and lastly, but by no means least, one biological subject. It may be stressed that some biological training is today an essential to any liberal culture and should be as much an obligatory part of a school curriculum as arithmetic.

(To Be Continued)

Flückinger Medal Awarded To Dr. H. H. Rusby

From Sarasota, Florida, where Dr. H. H. Rusby resides, comes word that in May he will be awarded the Flückinger gold medal of 1937 by the National German Apothecary Association. The medal is being given in recognition of Dr. Rusby's 65 years of devotion to the sciences of medicine, pharmacy, and botany—65 years in which important new drugs, discovered by Dr. Rusby in the jungles of South America, have been made available to the medical world, in which many new and important species of plants have been made known to science, and in which he has waged a long and winning fight in the interest of pure food laws, unadulterated drugs, and against unethical practices in pharmacy and medicine.

Dr. Rusby, now nearly 83 years old, is personally responsible for the collection of 10,000 examples of economic plants in the Museum Building at The New York Botanical Garden, and for the complete guide to these many specimens, which the Garden published in 1921. Appointed Curator of the Economic Collections at the Garden in 1900 and Honorary Curator a few years later, Dr. Rusby has maintained an active interest in the affairs of the institution throughout the years since his work on this collection was virtually completed. A year ago he presented to the Garden an exhibit of more than 60 varieties of citrus fruits from Florida, which he had gathered himself.

The presentation of the Flückinger medal will take place in Frankfort-am-Main, Germany, the afternoon of May 29, during the German Apothecary Days, May 28-30. Professor Kofler of Innsbruck will make the presentation, while Dr. Rusby will arrange to receive the medal by proxy.

Dr. Rusby received his first medal at the Centennial Exposition in 1876 for his herbarium of plants of Essex County, N. J. In 1929 he was awarded in London the Daniel Hanbury medal for his "original research in the natural history of chemistry in drugs."

From 1888, Dr. Rusby was professor of botany, physiology, and materia medica in the Department of Pharmacy at Columbia University and now is Dean Emeritus there.

Student Gardener Activities

Fraser Macartney, who has been a student gardener at The New York Botanical Garden since June 1936, has been selected by a committee of the National Association of Gardeners as the 1938 exchange student for Kew. He will go to England for a year of work and study at the Royal Botanic Gardens there about July 1. Mr. Macartney will receive his certificate from The New York Botanical Garden's Science Course for Professional Gardeners this month.

Stephen J. Cutting, who will soon be completing his year at Kew Gardens in England as the 1937 exchange student, plans to spend the following twelve months at the Berlin-Dahlem Botanic Garden. While Mr. Cutting has been studying at Kew this past year, Frank J. Mackaness, a Kew student gardener, has been at The New York Botanical Garden.

When the herbariums of native plant material collected by the student gardeners during the past year were submitted for examination recently, the excellence of two of them in number and diversity of specimens, arrangement, identification, and quality, caused the honors to be divided evenly. Prizes were accordingly awarded to Fraser Macartney and Ralph Pinkus, each of whom had collections of nearly 300 specimens. The material was all gathered on the student gardeners' own time, some of which was spent on organized field trips.

The prizes were presented at the third annual dinner of the Gardeners Forum, April 2 at the Beekman Towers Hotel. Dr. William J. Robbins made the awards. Addresses were given by Dr. E. D. Merrill, William Murray of Bobbink & Atkins, and by the guests of honor, James Stuart and Robert Scott. Others among the 64 present included Dr. H. A. Gleason, T. H. Everett, who acted as toastmaster, and six former graduates of the science course who are now employed elsewhere: Donald Dodds, Edward Brennan, Martin J. Crehan, Charles F. Guntner, George Lupton, and Robert Weidner.

Each of the former students gave a brief talk, as did Mr. Mackaness, Mr. Macartney, and Howard Swift, who was the first exchange student to go to Kew.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Pioneer Agriculturist

SOLON ROBINSON, PIONEER AND AGRICULTURIST. Selected writings edited by H. A. Kellar. 2 vols., 1,138 pages, illustrated, indexed. Indiana Historical Survey. Indianapolis. 1936.

Here is a fascinating picture of American life of a century ago; the story of a Connecticut-born man who became one of the pioneers of Indiana, and in addition to activities as postmaster in two towns, real estate business, merchandizing, politics, auctioneering, carried on agricultural experiments, and visited most of the states east of the Mississippi to observe and report on methods of agriculture. In two volumes of more than eleven hundred pages, after some fifty pages of preface and introduction, H. A. Kellar has presented 242 separate items of Solon Robinson's writings, covering the years from 1827 to 1851. Included among these items are advertisements, temperance songs and other poems, fiction, religious writings, political accounts, cookery recipes, new plants, farm labor, many notes regarding agricultural practices, and international aspects of agriculture. The material in these two volumes is taken almost entirely from several farming publications, such as the *Prairie Farmer*, the *Cultivator*, the *American Agriculturist*, the *Farmers' Cabinet*, and the *Plow*. In later life, Solon Robinson wrote extensively for the *New York Tribune*.

From the botanical point of view, the interest in Robinson's writings will be found in the many references to different species, both crop plants and weeds, to plant diseases and means of treatment, in his advocacy of forest tree planting and conservation, in his discussion of the value of such spiny plants as Cherokee rose, and Osage orange for fencing. One particular citation out of many interesting items may be included. It refers to rust in wheat, etc., and to an expected 500,000 bushel yield for Lake County, Indiana.

"This at 50 cents per bushel, would have brought into our county $200,000. This sum would have liquidated an immense amount of debt; but owing to the *fly*, *army-worm*, and *rust*, our wheat has been measurably destroyed; . . . and we shall not have 100,000, and this will be of very inferior quality. .

"This is certainly the greatest loss by rust that I was ever acquainted with. And in all this vast extent, I don't think there is a barberry bush. So that is not the cause. That the fly is the cause, as advanced by the Laporte writer is something new, and I must doubt the correctness of the theory."

After noting the opinion of some that "the stalks grew so fast that they bursted and let out the juice and that turned to a red mould", Robinson continues:

"It is an important inquiry, 'what is the *cause* of rust in wheat?' But a much more important inquiry, 'What can be done to prevent it?' "

R. C. BENEDICT.

Agricultural Science

A.B.C. OF AGROBIOLOGY, by O. W. Willcox. 323 pages, index, graphs, charts, tables. W. W. Norton & Company, Inc., New York. 1937. $2.75.

Much space is devoted in Willcox's new book to the cumbersome explanation of a science which has never been comprehensible to many. Probably the most important feature of this book is its ability to make a clear definition of agrobiology, a comparatively new science. Conclusions drawn from experiments which were conducted with the aid of modern agrobiologic methods are undoubtedly valuable to all plant-conscious individuals.

Although the material is excellent and the ideas are scientifically correct in every detail, I wonder if most practical plant growers would not penetrate just far enough to be intelligently confused

Surely it is not a book for an ordinary farmer, nor could it be recommended as a reference for a scientific investigator, but a technical agriculturist might readily apply any of its principles to make more efficient use of the soil.

DONALD P. WATSON.

Some Interesting Facts About Legumes

LEGUMINOUS FORAGE PLANTS. D. H. Robinson. 119 pages, index, glossary, charts, statistics, drawings. Longmans-Green & Company, New York, 1937. $2.40.

"Leguminous Forage Plants" by Dr. D. H. Robinson is an English book written by an English author. As suggested in the preface, the book is designed to enable interested persons to identify the important leguminous plants grown on the farm.

The author has described in considerable detail each of the more common legumes, both as seedlings and as mature plants, and has used many sketches to illustrate and supplement the subject matter. The description of each of the plants considered includes habit of growth, root and stem development, leaf structure, flower formation, nodule growth, and nitrogen fixation as well as the history and uses of the particular plant.

While the subject is presented from an Englishman's point of view, and applies particularly to English farming, it is, however, equally applicable wherever leguminous plants are grown successfully and should be of especial value to anyone interested in the study and identification of these important crop plants.

In addition to a description of the legumes commonly grown in this country, there have been included several that are less well known here but that have, within quite recent years, been introduced to American agriculture.

Since this book deals with a particular class of not-too-well-known agricultural plants, it will probably not be of special interest to the lay reader, but should afford a ready reference to teachers, students, agricultural workers, and farmers interested in these increasingly important forage crops. Altogether, it presents in easily accessible form material not generally included in detail in other works dealing with the production of leguminous crops.

L. M. STEPHENS.

A Tree Manual for the Northeast

TREES OF NORTHEASTERN UNITED STATES, NATIVE AND NATURALIZED. H. P. Brown, 490 pages, illustrated, indexed. Christopher Publishing House, Boston, 1938. $3.

In enlarging and revising his earlier "Trees of New York State, Native and Naturalized," Dr. Brown has given to the residents of the northeastern states a most helpful and needed manual. Of particular interest to both beginning and advanced students are the chapters on "Special Morphology," discussing the structure of the floral and vegetative organs, together with sufficient drawings to illustrate the text; the "Conspectus," with family and generic descriptions and additional keys to the species; and the "Derivation of the Names of Trees" (contributed by C. C. Forsaith and A. Rehder), containing a short discussion of the linguistic origin of plant names followed by an excellent list of generic and specific names and their derivations. There is also a full technical glossary.

Two pages being devoted to each species make the book particularly useful. The right hand page bears the text with its paragraphs under the separate headings of Habit, Leaves, Flowers, Fruit, Winter Characters, Habitat, Range, and Uses, while the left hand page bears the illustration and its legend. The plate consists of a spray or single mature leaf; a twig bearing flowers and sometimes the juvenile leaves; enlargements of the flowers; the fruit; the seed; a twig in the winter condition; and any other features of special diagnostic significance. The text and plates are generally accurate and complete. It is to be regretted, however, that in the printing some of the plates did not register evenly, at least in the copy before the reviewer, detracting somewhat from the usually excellent drawings.

A particularly helpful feature and one not often found in books of this type is the three keys which lead, in most cases, directly to the species: one based on leaves, one on fruits, and one on twigs.

Several things in the book, however, are to be regretted. One (for which the author is not to be too greatly censured) is the inclusion of only three of the various species of *Crataegus* which occur within his area—and one of these introduced. Another is his insistence in using an abominably mixed system of English

measurements. The following fractions of an inch and their multiples have been used in both keys and text: 1/32, 1/24, 1/16, 1/12, 1/10, 1/8, 1/6, 1/5, 1/4, 1/3, and 1/2. It is doubtful whether the metric system would have been as confusing to a few readers as the system used is sure to be to the majority. The student after purchasing this most excellent text will find that he must further invest in a rather expensive and generally bulky, multiple-scale, draughtman's rule before he can use it with any degree of accuracy. By using these unusual denominators, the author has forced the printer to use, on the same page (as on p. 293), as many as three different fonts of type to express the fractional parts of an inch. Owing to this lack of uniformity, the beginner may be confused and unable (p. 60, line 27) to identify either *Paulownia* or *Catalpa* which key out on the basis of "Leaves 5/14 inches long." The line should read: "Leaves 5 - 14 inches long."

Yet in spite of these minor items which seem to detract a little from its general excellence, the reviewer unhesitatingly recommends Dr. Brown's book as the best and most usable work of its kind on the arborescent flora of the northeastern states.

W. H. Camp.

Current Literature At a Glance*

By Carol H. Woodward

Taxonomic Index. In response to the increasing demand at The New York Botanical Garden for references to current taxonomic and floristic literature, the Garden is issuing monthly a mimeographed index to be distributed exclusively to members of the American Society of Plant Taxonomists. Subjects covered include taxonomy, floristics, phytogeography, phylogeny, and, when critical and extensive floristic lists are given, ecology. Only North American vascular plants, bryophytes, and lichens are being considered. More than 100 current serials, in addition to special publications and books which come to the Garden's library, are being regularly consulted for the compilation of this index, which is under the editorship of Dr. W. H. Camp. Contributors are Dr. H. A. Gleason, E. J. Alexander, Dr. H. N. Moldenke, and Dr. J. H. Barnhart.

Thiamin. Dr. William J. Robbins, reporting in the February *Proceedings of the National Academy of Sciences* on the results of experiments with organisms requiring thiamin (vitamin B_1), concludes that a biological method might be devised whereby the presence of this vitamin and its intermediates (such as thiazol and pyrimidine) might be detected by observing controlled growth reactions.

Elms. The American Forestry Association in Washington has issued an illustrated report on the Dutch elm-disease under the title of "The American Elm." It has been prepared in co-operation with the National Shade Tree Conference, Garden Club of America, Massachusetts Forest and Park Association, and the New Jersey Federation of Shade Tree Commissions.

Viability. Studies of the rank vegetation which arose in the bed of an artificial lake which was drained after a quarter-century of use are offered as evidence that seeds may remain viable for at least 25 years when embedded in moist and presumably cool silt. Members of the Grass, Sedge, and Buckwheat families were most numerous. The report, by Cecil Billington, is presented as Bulletin 11 of the Cranbrook Institute of Science, Bloomfield Hills, Mich.

Mexico. The December issue of the Mexican *Anales del Instituto de Biologia* is devoted to the geographico-botanical regions of that country. While the illustrations are rather foggy, they do convey an idea of the types and dominant species of plants in the different regions.

Seeds and Soils. A series of reports on experiments with seed and potting composts from the John Innes Horticultural Institute in England has been running in the *Gardeners' Chronicle*. No. 4, which appeared Feb. 26, gave the results of experiments on sterilizing different soils under different conditions, by different methods, and for different plants.

Willows. In the first number of Vol. 3 of *Castanea*, which is published by the Southern Appalachian Botanical Club, Carleton R. Ball describes eight species of willows of the southern states.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

MAY, 1938

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A PLACE IN WHICH TO LEARN

As the approach of summer brings into increasing bloom the flowers in meadows and woodlands, in intimate home gardens, on large estates, along landscaped highways, and in parks, the world re-awakens to the great beauty of growing plants and appreciates again the indispensable role that plant life plays on the earth.

Whatever one's problem with living plants may be, The New York Botanical Garden offers a solution. The natural growth encouraged in certain parts of the grounds shelters many native wild flowers. In the cultivated areas, plants of every type for small home gardens as well as for more elaborate handling on large estates may be seen in various beds, borders, and special groups. Flowering bulbs, annuals, herbaceous perennials, shrubs, native and exotic trees which are suited to the climate: all may be enjoyed and studied at appropriate seasons. The roadways which wind through the grounds of the Botanical Garden, eventually meeting the splendid highways of Westchester County, are bordered by the finest of trees and shrubs in effectively landscaped surroundings.

While one of the horticultural purposes at the Botanical Garden is the creation of pleasing pictures for the public eye, because it is a *botanical* garden a primary aim must be to show as many different types, species, and varieties of plants as can be suitably grown, and to carry out a clear and careful system of labeling.

A serious study of the plantings at the Botanical Garden will enable the horticulturally minded person to learn a great deal about the plants he already has or may wish to raise. The Botanical Garden is a helpful and a pleasant place in which to give oneself outdoor lessons in horticulture.

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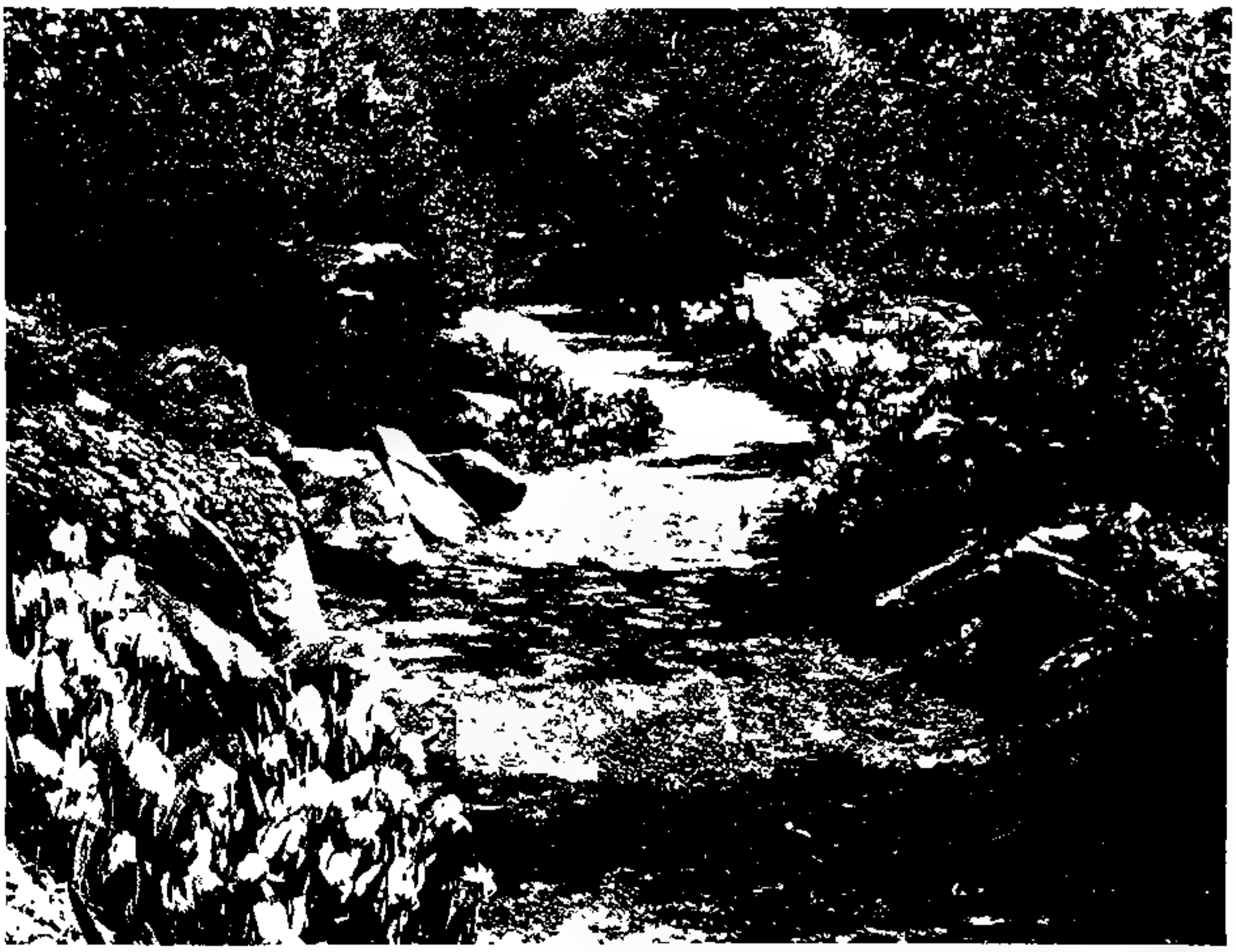
Springtime in the Rock Garden



A shadowed path invites the lover of flowers to go wandering through the rock garden, where at this season are colorful masses of bloom springing from the deep pockets of soil between the rocks, brightening the wooded banks, bordering the stream, or reflected in the pool of the new bog garden. Each week—in fact, every day—at this time of the year brings new buds to life and enhances the beauty of the floral display. During Rock Garden Week, which is announced on the next page, the Thompson Memorial Rock Garden will be revealed at the height of its season of bloom.

Rock Garden Week, Last Of Month, Preceded By Members Days May 26 and 27

WITH the Thompson Memorial Rock Garden entering the most prolific period of bloom that it has known since its establishment five years ago, Rock Garden Week will be observed at The New York Botanical Garden May 28 to June 1.

The two days preceding the public opening of Rock Garden Week have been designated as Members Days, on which members of the Garden will be admitted upon presentation of cards which have just been distributed.

Rose Week is announced for June 12-18. On both occasions, information tables will be set up at the entrance to each garden on display, from which questions will be answered and guides provided for visitors who desire specific information about the plants.

Among the 6,000 roses of some 700 varieties, which comprise the Rose Garden in the southeast portion of the grounds, there will be this year a large number of new Hybrid Perpetuals, some new Hybrid Teas and Polyanthas, and an entire bed devoted to new roses which will appear under numbers, as they have not yet been named. Several varieties are being shown at the Botanical Garden for the first time anywhere.

Since the last inventory was made of the species and varieties of flowering plants in the Thompson Memorial Rock Garden, many new subjects have been added, so that it is estimated that this spring, with the trees and shrubs which form the background of the garden, there are nearly 2,500 different kinds. Of some of the newer and rarer sorts, there are only single specimens, while others have established themselves and are increasing.

With the completion last fall of construction of the bog garden at the southern end, the Thompson Memorial Rock Garden now covers more than three and one-half acres. Located in the glade which lies east of the Museum Building, this garden offers varied sites for different types of plants. The wooded slope down which a cascade tumbles over rocks contains many native species, some of which grew there naturally before the garden was made, but

most of which have been especially raised for that bank. Partridge-berry and wintergreen cover the ground beneath a tree, trailing arbutus, which flowered in April, is just beginning to find a foothold there; violets, mertensias, woodland ferns, and other native plants appear there as though growing wild.

Within the spray from the cascade are plants which enjoy constant moisture in the air as well as near their roots. Where the small stream runs along the floor of the glade, trollius blooms in summer on the banks, and farther on are bluets. Beyond, where the bog garden has just been established, Japanese primulas on the shore are now reflected rose-red in the water.

At the opposite end, a large area has been specially treated with peatmoss and planted to varieties of heather, which will be in bloom in the fall. Lime-loving subjects are segregated in another part of the garden. Alpine plants which thrive best when their roots can run through a cool crevice in a rock—such as *Ramondia pyrenaica* or *Phyteuma comosum*—are placed in the special situation they demand.

A number of plants from the southern Appalachians, elsewhere little known in cultivation, are growing successfully in the Thompson Memorial Rock Garden. Their seeds were brought back to New York five years ago by the Botanical Garden's expedition into the mountains of the south. Plants from the Rockies, collected in 1936 by the Garden's western expedition, which went in search of American alpine plants for cultivation, are still being tested for their usefulness in the east. Only a few of these may now be seen in the rock garden. When they have proved their worth and have increased enough to make an attractive showing of bloom, they will be more noticeably displayed. Meanwhile, *Lewisia Tweedyi, Lewisia rediviva, Lewisia Heckneri,* and other species from the west, all acquired several years ago, are blooming successfully every spring in the Thompson Memorial Rock Garden.

Among other plants expected to be prominently in bloom during Rock Garden Week are a number of saxifrages, including *Saxifraga Cotyledon* of the encrusted group; *Silene virginica,* with crimson flowers, *S. caroliniana,* in varying tones of pink, and *S. Zawadskii,* from the other side of the world, with pure white flowers and loose rosettes of glaucous leaves; and *Helianthemum appeninum roseum,* one of the finest varieties of the sunrose.

Louise Beebe Wilder

A Tribute by Sarah V. Coombs

FRAMED in the wide doorway of her home, Louise Wilder's garden lay brilliant in the sunlight as friends gathered, trying to realize that they were there because her bright spirit had gone on somewhere. Had it gone? It seemed to be as much in that garden and home as it had ever been. It was somehow triumphant and was very near. Perhaps the garden that lies "eastward in Eden" is not so far away.

Those who love flowers and work with them acquire by that service a sort of immortality. They are glorified by it and it is impossible to connect the thought of death with them. It is easy to think of them walking in flower-filled meadows and listening to the songs of celestial birds.

We who knew Louise Wilder will miss her greatly. What she did for horticulture is another story which will be well and truly told by others. We shall miss the friend whose place, we realize, cannot be filled. If we have worked with her, we shall feel doubly that a rare soul has gone away, leaving behind many memories of the honest, earnest work she did in her chosen task and of her friendly, warm, often amusingly human outlook on the world and life.

(A brief biography of Mrs. Wilder, whose death occurred April 20, will be found on page 114.)

In the moraine will be found *Androsace lanuginosa*, *A. sarmentosa* and its varieties, and a number of other choice plants which the rock-garden specialist will particularly enjoy. *Allium Schuberti*, from whose central ball of flowers smaller clusters extend like shooting stars, and *A. Karataviense*, with two exceedingly broad thick leaves and a heavy umbel of purplish flowers, with *Allium roseum* and *A. unifolium*, reveal interesting variations among the flowering onions.

Noteworthy also will be *Achillea tomentosa* King Edward; a satisfactory little white crucifer known as *Schizocrckia Bornmülleri*; *Bellium bellidioides*, a small pink composite; *Stylophorum diphyllum*, the celandine poppy of the central states; and *Anthyllis montana Jacquini*, an attractive variety of a silky-leaved Alpine legume.

These are of course only a fraction of the interesting plants to be seen, not only during Rock Garden Week, but throughout a long season. Each species and variety is clearly and carefully labeled. Questions about the plants and the garden are invited from visitors.

Flowering Bulbs For The Rock Garden

By Ethel Anson S. Peckham

THERE is much discussion as to the advisability of putting bulbs in the rock garden or into a moraine. Some say that they are a nuisance and that they do not belong in such gardens. The latter seems rather a ridiculous idea as bulbous plants grow on mountainsides among rocks and on screes and in moraines. There are unsuitable bulbs for rock gardens, of course—those too tall or of too rank growth for the companion plants—but there are also many which are entirely at home there.

In rock and moraine gardens plants should be well placed where they have the soil and drainage they enjoy, together with the proper exposure, and where they can persist with a minimum of care except to restrain one from the other. One difficulty with the bulbous plant is that the leaves have to remain until they are ripened. In a bulb with heavy foliage this is detrimental to a cover plant which may be the companion of this variety and, in the rock garden, one should not have to resort to the planting of annuals, or any plant used as such, to cover bare spots left when the bulbous plant disappears from the surface and takes up its revivifying work during dormancy.

However, there are numerous low-growing plants that can be used for ground-covers if attention is given them when the bulbous plant is trying to push through and, by a judicious selection of the ground-cover so that very valuable low-growing plants are reserved for another purpose, all will be serene. There are plenty of sedums that are good to use with bulbs. Some rock-gardeners have been known to sniff in scorn at sedums; but there are many to choose from and some are not so coarse and weedy as others. For use with crocuses and some of the grape-hyacinths they do very nicely. *Mazus rugosus* and a few of the veronicas can be planted with narcissi. These grow easily enough to stand a little hard treatment while the daffodils bloom and, if the foliage of the latter is bent up into knots and tied with raffia while it ripens, they get their chance. Crocus foliage must not be tied in this way nor must that of brodiaea; but both of these are much lighter and thinner and soon die away. For such things as brodiaea I have

Photograph by Reginald A. Maltby & Co.

Venetia is a rare variety of Narcissus which is especially suitable for culture in rock gardens.

found the juxtaposition of plants like rock-roses (*Cistus*) is a good plan. These more shrubby affairs afford protection in bad weather and they can be tidied back on the edges in springtime. After the bulbs disappear they spread nearly over the vacant spots. Colchicums have heavy foliage but they can be planted between such things as mossy saxifrages with enough space so that when they become top-heavy with seed-pods, they can lie down to ripen: their large tulip-like flowers coming up in autumn among the mossy clumps will be exceedingly lovely.

In the semi-shaded portions of the rock garden autumn crocuses, dog-tooth violets (*Erythronium*), snowdrops (*Galanthus*) and snowflakes (*Leucojum*) may be used and indeed, snowdrops (single ones) will grow in what is full shade in summer. Hence combinations may be made with ferns, epimediums and rare, fine-leaved English ivies. The summer snowflakes will grow in semi-shade where they can be combined with *Iris cristata* and ferns, but they are really better in full sun and should be used sparingly as a tall accent together with phloxes, candytufts, aethionemas,

etc. Such daffodils as Trewirgie, Cheerfulness, Golden Perfection, Moonshine, Thalia, and Harvest Moon should be carefully placed so that they will not spoil the general design of the "high and low."

It is a mistake in planting a rock garden to ignore the aesthetic, for when plants with the same style in habit of growth are spotted about, the final effect will be bad. Things should be in masses whether of color or shape. Too many spear-shaped leaves standing up in bunches evenly all over the garden or too many patches of strap-shaped leaves, no matter what position they take, will soon ruin the general appearance. The perfect rock garden will be full of treasures and, at the same time, be a feast to the artistic eye. Drifts of white flowers need some other color to enhance them and care should be taken that the bulbs do not bloom at the same time as the companion plant if they are of the same color tone. This may be deliberately planned for *some* places but would not be attractive all over the garden.

Rock gardens are excellent spots to segregate plants that need a particular soil or protection. A backing of a large rock facing the warm spring sun will often pull a plant through that would be discouraged and finally killed by late spring frosts. The rock absorbs the heat and helps to raise the temperature at night. Bulbous plants are especially liable to be harmed by fierce late frosts. To achieve their best and to persist they need all their top growth. Several years of being killed back will cause them to give up the ghost. The destruction of the tops by mice or rabbits as they come up in spring is another danger. Naphtha flake, which may be planted with bulbs of tulips, lilies, and crocuses to make them distasteful to mice, may also be sprinkled on the young leaves to discourage these pests. Patches of rare, small bulbs can be planted in baskets or cages made of strong wire mesh. One has to be particular not to arrange them so the plants appear stiff. Cages are best made by bending the netting into a suitable shape with pliers and arranging a side that comes above the top to be finally bent over after the bulbs have been engineered into place. Patience and a little practice do the trick. The finely sifted soil then can be dribbled in and more put on top before the ground-cover is planted. At least some of your treasures will be saved in this way because chipmunks are demons about digging up rare crocuses, especially during a drought in early summer.

They love to dine on the nutty flavored kernels and always seem to enjoy most the species crocuses or the new hybrids or rare forms!

Then there are plants that like peaty ground, some of these being those tiny gems, *Narcissus minimus, N. triandrus* and its varieties, and the snake's-head fritillaries (*Fritillaria Meleagris*). These can be tucked in under the edges of heather on the *sunny* side, for they love such a place.

Do not try to put bulbs in the bog garden; they do not like to sit in water. However, damp positions in spring will sometimes do provided the water runs off rapidly. Watch out also that strong-rooted plants like columbines and some of the phloxes do not seed over into the bulb patches for their heavy roots will smother those sleeping below.

The rock garden is just the place for the smaller species tulips such as *Tulipa Kaufmanniana* with its various forms; *T. dasystemon, T. biflora,* etc., also for *Bulbocodium vernum,* a relation of colchicum; for *Iris reticulata* and its several color forms; for species crocuses such as *C. biflorus, C. Salzmanni, C. Sieberi, C. chrysanthus,* etc., and many others. Rare varieties of the smaller squills (*Scillas*) such as forms of *S. sibirica, S. biflora,* and its cousin, the glory-of-the-snow (*Chionodoxa*); unusual grape-hyacinths among which are *Muscari comosum* and white varieties of *M. botryoides* and *M. neglectum* together with *Hyacinthus azureus,* often taken for a grape-hyacinth, and perhaps, if you are lucky, some old, real *H. orientalis* retrieved from an ancient garden—all these are excellent.

Bulbs in rock gardens are all right, then, if you exercise care in choosing the correct varieties and placing them where they have proper conditions to grow happily; also if you see that they are neither dug into by humans, choked by neighboring plants, nor eaten by predatory animals. By all means try them, for the plant that goes away part of the season is always the one to give the most joy, just as the well-beloved friend is nearly always the one who appears more charming after each brief absence.

Modern Study of Plants In Relation To Education

By E. J. Salisbury

(Continued from the April issue)

ONE great merit of botanical study from the point of view of general education is that, if properly taught, it provides perhaps the best medium for training in accurate observation. Observation consists essentially of two separate processes, namely, seeing the object or phenomenon and the apprehension of what is seen. The visual perception of the good and bad observer may be alike adequate, but it is in the degree of their apprehension that they differ. To train such powers it is essential to check the accuracy of appreciation either by means of verbal description or graphic representation. The graphic method is clearly more suited to the adolescent mind, whose limited vocabulary and limited feeling and understanding of the nuances of meaning of words unduly restricts his verbal precision. Drawing, if regarded strictly as a statement of observed facts, offers the best means of such training, and botanical material, because of its well-defined organization, is peculiarly suited for this purpose.

From the cultural point of view, plant life and all that it implies may be regarded as the foundation of a vast extent of human activity and the basis of a large and essential part of every human environment. Because neither we nor the animals could persist without plant life, it follows that much of the present distribution of these organisms over the face of the earth can only be understood in terms of the plant life either of the present or the past. Even man's industrial activities have been largely localized and in part determined by the geographical distribution of vegetation, whether it be that of the forests, of perhaps 280 million years ago, which gave origin to our coal deposits, or the vast extent of grasslands that have determined the location of pastoral communities.

A realization of the widespread demands made upon plant products would probably astonish many of those who, like Mr.

Babbitt, find in the mechanistic devices of the age their chief delight. Yet it has been recently estimated that a thousand Ford motor-cars utilize in their manufacture the entire plant yield of more than six hundred acres, and this quite apart from the indirect demands for grazing necessary to furnish the materials of animal origin. Despite the vast areas of the earth's surface devoted to the growth of foodstuffs, of textile fibres, of timber, rubber, tea, tobacco, and innumerable other plant products, the plant remains perhaps the least known and appreciated of all man's servants by those who lay claim to any cognizance of their environment.

Even the town dweller can scarcely fail to recognize the indirect contacts of his everyday existence with the activities of agriculture, forestry and horticulture, and, if education is to be interpreted as a means of enabling the individual to have an intelligent appreciation of and harmonious relations with his environment, then a knowledge of plant life is manifestly essential to that end. I should almost feel that an apology was necessary for expressing sentiments so trite were I not sure that whatever agreement there may be in theory, our educational curricula bear witness to the neglect of these principles in practice.

The increasing diversity of pursuits in a progressive science is only too liable to be accompanied by an increasing detachment of interests and divergence of expression. Specialization, which should be accompanied by greater co-ordination, is only too frequently the begetter of disintegration rather than synthesis, and the mutual interdependence of one branch on another is lost sight of. One of the main purposes which the British Association should serve is to promote the co-operation between workers in different fields. But we only come together for a short week in each year, and so it is to the universities that we must look mainly for the continuous fostering of a liberal outlook both on science as a whole and within the domains of each particular subject.

In its earlier phases, botany was naturally concerned largely with description, and in such branches as taxonomy, morphology, anatomy, cytology, mycology, palaeobotany and plant geography the descriptive aspect must necessarily play an important part, just as in ecology, physiology, bacteriology and genetics the experimental aspects should predominate. But in all, the cultural

value can only be maintained if form and function are closely integrated. Each branch has its own contribution to make in this respect not only to the pure science but also to its applied aspects in agriculture, horticulture, pomology, sylviculture and plant pathology. The mere enumeration of these branches, whether pure or applied, envisages the richness of the field we cultivate and the extensive contribution that botany can make towards both the enrichment of the human mind and the well-being of the race. But the accumulation of data in these varied directions of inquiry will only fulfill its full purpose if the many threads are continually woven into the warp and woof of a single fabric.

The retention of plant physiology within the domain of botany has saved us from the worst evils of the study of form unrelated to function. This has also been one of the chief factors which led to that synthetic approach to our subject which concerns the relation of the plant to its surroundings. The supreme value of ecology, however, lies not so much in the attention which it focuses upon the mutual relations of organisms or even upon their relation to the environment, but in the synthesis which ecology achieves, into a single picture, of so many aspects of botany itself and so many branches of human knowledge. Its high educational and cultural potentiality is an outcome of the fact that it is the very antithesis of that common failing of the human mind to think of different subjects as isolated compartments of knowledge and not as different facets of one and the same jewel.

When we attempt to understand any plant community, the necessary study of the physical environment leads us at once into realms of soil structure, into the physical problems connected with water retention and water movement involving colloid properties and surface action. So, too, the chemist and the meteorologist make their contributions to our concept of the habitat, whilst the bacteriologist, the mycologist and the protozoologist all help us to envisage that teeming population of bacteria, fungi and protozoa in the soil which, by their proper balance, maintain a healthy circulation of chemical products and are a necessity for the maintenance of the supply of raw material for the higher plants and animals.

Since the environment of the present is in some considerable degree the consequence of that of the immediate and sometimes of the remote past, the study of external conditions brings us

LATE SPRING FLOWERS IN THE THOMPSON MEMORI ROCK GARDEN

Lewisia Heckneri

Phyteuma comosum

Cerastium tomentosum

Silene Zawadskii

Allium Karataviense

Marshallia obovata

Cytisus albus

Schivereckia Bornmülleri

Plants at the stream's edge

into contact with the contributions of glaciologists and historians, whilst even the student of "place names" may materially assist in the reconstruction of those past conditions that in part have determined the present state.

When we turn from the study of the habitat to that of the vegetation which it supports, we are at once confronted with the question as to the extent to which one is in equilibrium with the other.

The morphologist and the anatomist furnish the data upon which we base our judgment as to the degree to which the external form and internal structure have contributed to render the organisms suited to the environments that they frequent. In so far as there is adaptation, whether passive or active, in this respect, to that extent the community is in equilibrium with its surroundings and represents a climax, subject, it is true, to secular change but of a relatively stable character.

The contribution of the systematist is to distinguish between the more critical species and races which exhibit a localization that less meticulous examination might readily ignore and which often have an ecological importance far greater than the Linneans of which they are the segregates. The experimental conclusions of the physiologist in the laboratory must be applied by the ecologist to the elucidation of problems in the field, complicated and often profoundly modified by the continual operation of the competitive factor.

Finally, knowledge of the life-histories of the constituent organisms, the reaction of the various phases of their development to the environment, their modes of reproduction, their establishment and extension, comprise a mass of knowledge to which many astute observers have contributed and amongst whom the amateur holds an honored place in our esteem. The *clichés* of the politician with regard to policies could be applied with far more than their usual significance to the ecologist, who might with some reason be described as "exploring every avenue" and "leaving no stone unturned" in his attempt to reveal the causal relations underlying the social organization of plant life; but this all too brief résumé of the contents and contacts of a single branch of botany has, I hope, sufficed to emphasize that the wide range of knowledge invoked by the ecological approach, though constituting its chief

difficulty, is the very basis of its cultural value, since it weaves together into a comprehensive whole so many threads of knowledge spun by the specialists upon the wheels of research.

The value of such approach is also obvious in relation to every-day affairs. In any well-considered plan of land utilization of catchment areas the ecological aspects are apt to be ignored. The land surface under its various guises may be likened to a sponge which absorbs the divers forms of precipitation and allows the water with more or less rapidity to find its way into the streams and rivers. But the effectiveness of the land surface for holding back the water varies according to whether it is under high forests, scrub, grassland or is arable. Each type of plant cover has its own absorptive factor and its own resistance to erosion. Furthermore, each vegetation type is not static but dynamic, and its role in this respect changes both with the seasons and with the passage of time. If therefore our land utilization is to be properly conceived, due regard must be had to the proportions in which the various communities, whether natural or artificial, are present. If we are to avoid floods and droughts, we must preserve rural England for practical, as well as aesthetic, reasons. To all this ecologists can contribute valuable help, the more so that with the passage of years the surface of our roads has become better and less absorbent, and our ditches are kept cleaner so that drainage to rivers has generally become more effective and rapid. Hence what sufficed to restrain extreme conditions a hundred years ago would not suffice today. Afforestation of the catchment area of the Thames and other rivers would, in the long run, be perhaps far more effective and less costly as a guarantee against future floods or droughts than grand-scale engineering works, and whilst the former would produce ancillary assets of great value the latter would not.

Prof. F. W. Oliver pointed out, in reference to the reclamation of foreshores, that the plastic plant can and does meet the constantly changing impact of the forces of Nature in a way which the dead material of the engineer cannot hope to emulate, and at a far lower cost. But such biological control demands not only a comprehensive knowledge of the life-histories of the species utilized, but also an appreciation of the environmental factors, dynamic as well as static, that is summed up in the phrase ecological foresight.

Another matter is the much-discussed question of the preservation of natural areas. Owing to the widespread ignorance of biological knowledge, the dynamic character of vegetation is by no means widely realized. There are indeed many educated people today who think that to preserve an area all you need to do is to leave it alone. The fact that our open downland, presented to the National Trust, may, if left unhindered, ultimately cease to be downland and become woodland, with the loss perhaps of the very features for which the area was preserved, is for most a novel concept. But an enlightened policy of such control of national reserves and all that this implies will only be possible if the rising generation has been inculcated into a biological mode of thought.

It is probably true to say that no branch of botany could be cited that has not its important practical applications. Botany needs no defence in respect to the practical utility of its pursuit, although it is probably true to say that the majority of those who reap the benefits of its achievements are unmindful of their source. But it is, I feel, the contribution that botanical knowledge can make towards general culture and spiritual contentment that is its chief claim to rank high in our educational scheme.

A sympathetic understanding of botanical thought and progress is essential to a community which is to deal adequately with such national problems as agricultural policy, land utilization, afforestation, drainage and water supply, the preservation of rural areas or the provision of national parks. Only on the foundation of a knowledge of plant life and its requirements can an educated public opinion be built up that will receive and give effect to well-considered legislative action. Moreover, it is perhaps truer of these pressing questions than of most that a sympathetic and informed public opinion is essential to the continued effective operation of any policy however well conceived and enlightened.

Certificates Presented To Eight Students

Certificates for the completion of the two-year Science Course for professional gardeners at The New York Botanical Garden were awarded to eight students at an informal ceremony conducted at the Beekman Tower Hotel the evening of April 26. Dr. William J. Robbins gave a brief opening address outlining the functions of the course, from which 57 have been graduated since the first class completed its work in 1934. Later he made the presentation of the certificates.

Col. J. E. Spingarn, a member of the Board of Managers who is an outstanding horticulturist in his own right, spoke to the student gardeners, guests, and members of the staff on the dignity of the profession of gardening. Many former graduates of the Science Course attended the exercises. The members of the graduating class of 1938 were John Pierz, Ernest Hoelle, Arthur Bergquist, and Norman Smith, who are all employed on private estates, and John T. Moss, Fraser MacCartney, M. Truman Fossum, and Edward J. Brennan, who have been employed as student gardeners at the Botanical Garden.

"The men trained here in the prosecution of ornamental and decorative horticulture," Dr. Robbins said in his short talk, "will, I believe, carry on in this country the highest traditions of gardening."

Col. Spingarn's Address

In speaking of the "ever-increasing dignity of the noble profession of gardener," Colonel Spingarn pointed first to the sculpture of Michelangelo and of Rodin as works of immortal fame which emanated from the craft of the stonecutter of ancient Greece. The surgeon of today was once, he asserted, merely a barber, while the trained nurse has developed from a menial, a maid-of-all-work.

"What really turned nursing into a dignified career," he said, "was training. It was training that gave the profession standing and importance as distinguished from the original type of work performed.

"In all professions," he affirmed, "character is important, but the amount of training received, plus the training that you, for example, as gardeners must continue to give yourselves the rest of your lives, is what makes your own calling a profession of distinction."

Colonel Spingarn firmly expressed the wish that the gardeners of today would delve into the history of their profession, in order to give it its rightful place in the history of mankind.

"Who were the gardeners for Dr. Hosack, who established the first botanical garden in New York?" he asked. "You can find out by consulting the papers of Dr. Hosack, which repose in the New York Academy of Medicine, at 103rd Street and Fifth Avenue. There you will discover a complete record of every gardener who worked for Dr. Hosack during certain years. You have to hunt for these historical facts, but the search is worth while."

The first professional gardeners in America, said Colonel Spingarn, were the slaves on the southern plantations. They had a peculiar aptitude for the work, and it is to them rather than to their masters that the responsibility for the beauty of the southern gardens is due.

Two of the first professional gardeners in his own Dutchess County were black men, Colonel Spingarn continued. One of them, James Brown, on the Verplanck estate, kept a continuous diary for 35 years. The other, Alexander Gilson, on the Montgomery place, was the head gardener there for 50 years.

"They were held in the highest respect," he said, "and when they were buried they were laid beside the heroes of the period."

But in those days there was no organized training of gardeners. A. J. Downing tells us that during the thirties and forties of the nineteenth century—a period which coincided with the Irish famine—only three percent of the gardeners in America were native or naturalized citizens. Most of them were Irish and a smaller percentage were English, Scottish, and German. Many foreign gardeners continued to come here, and America depended for many years on men who had been trained abroad. These foreign gardeners brought with them a sense of the value of the trained over the untrained

gardener. But as long as we could import gardeners from Europe, there was no need to give them special education here. With immigration restrictions after the war, however, we have had to develop our own professional gardeners.

Utopia for a gardener, Colonel Spingarn declared, would be an employer who really understood and loved gardening but understood it well enough not to interfere unduly with the work of his employee. Another Utopia will exist, he said, when the horticulturist and botanist lie down together in absolute peace and calm. Still another will be realized, he declared, when it is discovered that the degree of Ph.D. is not as important as some men think it is. He confessed having once himself been afflicted with what he called the "Ph.Disease" and emphatically added, "I am ashamed of the scholars and scientists of my country who make an exaggerated shibboleth of this or any other academic degree. A scientist should be judged by his scientific attainments and essential wisdom and not by his degrees."

The earliest horticultural courses given in this country, which were generally offered by agricultural colleges, gave little training in "dirt gardening," the speaker said, but were instead theoretical, tending to develop experts rather than professional gardeners.

In present-day gardener training in America, the system used in the Royal Botanic Gardens at Kew, adjusted to American conditions, must necessarily be a model, he remarked, adding: "The New York Botanical Garden is trying to provide for its men an American equivalent for the work given at Kew, so that eventually the certificate of graduation will stamp every man who possesses it just as an M.D. or an R.N. stamps a physician or a nurse.

"Someday, you," he continued, speaking directly to the eight students, "will be followed by many because your certificate will confer upon you the dignity of belonging to a great profession . . . a profession which has as noble and dignified a past and as great a future as any profession in America today.

"I welcome you to this profession," Colonel Spingarn concluded, "which can fill the empty spaces of this great country with gardens that will transform it into the most beautiful place in the world. Only with the help of you professional gardeners can we make America a fit habitation for our hopes and dreams."

Louise Beebe Wilder

After an illness which had kept her confined to a hospital for nearly four months, Louise Beebe Wilder, horticulturist and author, died in New York of a heart ailment on April 20. Mrs. Wilder had been a member of the Corporation and of the Advisory Council of The New York Botanical Garden since April 15, 1936.

In recent years it is doubtful if any one individual had a greater influence on American horticulture than Mrs. Wilder. In 1936 she was awarded the Gold Medal of Honor of the Garden Club of America for her "outstanding achievement in introducing the growing of alpine plants in this country, for her general knowledge of horticulture, and for the excellence of her many books on gardening."

Her books and innumerable magazine articles, one of which had appeared every month for a number of years in *House and Garden*, were noteworthy in that they reflected exclusively her own experiences. In her small but remarkable garden in Bronxville she raised rare plants from all over the world, and she was able to tell others how they too could develop unusual and successful gardens. One of the early exponents of rock gardening in America, and continuously one of the foremost, Mrs. Wilder contributed greatly to the knowledge of alpine plants, introducing new ones into her own garden, and writing not only with incomparable charm, but also with profound authority about them.

Mrs. Wilder's Books

Her ten books, the last of which appeared last December, are:

My Garden (1916); Color in my Garden (1918); Adventures in my Garden and Rock Garden (1923); Problems and Pleasures of a Rock Garden (1927); Lucius Beebe of Wakefield (a genealogy) (1934); Adventures in a Suburban Garden (1934); The Fragrant Path (1934); What Happens in my Garden (1934); Adventures with Hardy Bulbs (1936); and The Garden in Color (1937).

During the last few years much of her work was illustrated with photographs

by her son, Walter Beebe Wilder. Her daughter, Miss Harrison Wilder, is a secretary for the National Council of Federated Garden Clubs.

Mrs. Wilder was a member of the Garden Club of America, Working Gardeners of Bronxville, Federated Garden Clubs of New York, and the Horticultural Society of New York.

News from South America

The first letter in many months from Dr. A. C. Smith was written February 22 from John Melville's ranch, Wichabai, on the Rupununi River in British Guiana, where Dr. Smith was making his headquarters for an additional three months of botanical collecting after other members of the Terry-Holden Expedition had returned to Georgetown and New York. The letter was received by Dr. W. H. Camp the middle of April. Robert Snedigar, herpetologist of the American Museum of Natural History, also remained to collect in an adjacent region. The two men plan to start for home in June, when John Melville, who has lived in the interior of British Guiana for many years, will transport them down to the coast.

With Mr. Snedigar, Dr. Smith worked in the Shodikar region—Shodikar Creek is the last eastern affluent of the Upper Essequibo—and in the Akarai Mountains for three weeks, spending a couple of days on the Brazilian slopes in the Trombetas basin.

First in the Region

This means, according to B. A. Krukoff, that Dr. Smith is the first man ever to make a botanical collection in the region of the upper Trombetas River, which until two or three years ago was entirely inaccessible—so much so, he says, that it might take a traveler from the Brazilian side up to five years to push through the forest beside the tremendous rapids of the river. Recently the country has been opened up by a boundary survey of the Brazilian government.

"The Upper Essequibo," wrote Dr. Smith, "is a beautiful country, densely forested. The divide is not much higher than 2,000 feet, not high enough to produce a noticeable change in the flora. The plants appear strictly Amazonian in relationship.

"We intended to descend the Middle Essequibo to the Rupununi, a route known to only one white traveler (Barrington Brown), but when we reached the Kuyuwini mouth the rivers were in flood and we were afraid the falls of the middle river would be impossible. So we retraced our steps up the Kuyuwini (strokes, I mean, not steps), and came back via the Rupununi head, arriving here at Wichabai yesterday. . . . The Rupununi at present is a succession of water holes averaging six inches in depth, and it will not be possible to get a boat with specimens down until the first rains at the end of May. . . I am now going to spend a few weeks in the Kanakus near the Takutu River."

Notes, News, and Comment

National Academy. An invitation address was given before the National Academy of Sciences in Washington, D. C., April 25 by Dr. William J. Robbins on "Thiamin and Growth of *Pythium Butleri*", in which he reviewed recent experiments he has conducted with the assistance of Frederick Kavanagh. Dr. Robbins was introduced by Dr. B. O. Dodge.

Members of the Garden's Board of Managers who attended the two-day session in the capital were Dr. R. A. Harper, Dr. Edmund W. Sinnott, and Dr. E. D. Merrill, who read a biographical memoir on Dr. N. L. Britton. Dr. W. A. Setchell of the University of California gave a similar memoir on Dr. M. A. Howe.

Exploration. Mount Auyan-tepui, in eastern Venezuela, is near the northern end of that botanically remarkable mountain range which includes Mount Roraima and Mount Duida. Its plateau-like summit, at an altitude of about 8,000 feet, was only recently explored by an expedition from the American Museum of Natural History. Although the objectives of the party were zoological rather than botanical, Mr. G. H. H. Tate was able to make a small collection of the plants. These have been presented to The New York Botanical Garden and are now being identified by Dr. H. A. Gleason, Head Curator. Several hitherto unknown plants have already been detected, including a fifth species of South American pitcher-plant.

Mycology. John A. Stevenson, Senior Mycologist in the Bureau of Plant Industry and Custodian of the C. G. Lloyd Mycological Collections, Smithsonian Institution, Washington, D. C., recently spent two weeks in the mycological herbarium studying the Botanical Garden's collection of woody fungi, principally those forms from the tropics in which the herbarium is especially rich.

Lecture. Dr. John Hendley Barnhart spoke on "Spring Wild Flowers" before the South Shore Garden Club at Greens Farms, Conn., April 6.

Tea. Dr. and Mrs. William J. Robbins were guests of honor at an outdoor tea given by the Board of Managers and the Advisory Council of The New York Botanical Garden the afternoon of May 5. Tea was served in one of the model gardens near Conservatory Range No. 1, from where the guests went to view the perennial border and the Thompson Memorial Rock Garden.

Current Literature At a Glance*

By Carol H. Woodward

Real Gardening. Robert S. Lemmon is editor and publisher of a new magazine entitled *Real Gardening*, in which he is aiming to present authoritative and practical material which will be of value to the serious gardener. It is the sort of publication for which a need has long been felt in the United States—one which can stand alone in serving the gardener or which can usefully supplement other gardening magazines. Small of format and simple in design, it is an effort toward the ideal, the editor says, "of a magazine that shall reflect the spirit of fact-finding, of directness, of helpfulness and clear sincerity which characterizes good gardeners the world over."

The first issue, which appeared April 25, contains more than a dozen expertly handled subjects, ranging from weeds to "pygmy" rhododendrons, from annuals to pruning complexes, besides a number of shorter pieces giving helpful pointers to the gardener.

Rubber-tree. In the *Harvard Museum Leaflets* for March 31, Albert F. Hill points out the correctness of *Castilla* rather than *Castilloa* as the name of the Central American rubber-tree.

Erosion. "What Is Soil Erosion?" is the title of a dramatically illustrated booklet issued by the United States Department of Agriculture as Miscellaneous Publication 286. Prepared by C. F. Stewart Sharpe of the Soil Conservation Service, it presents in its 84 pages only a few brief lines of text outside of the introductory pages, and these explain the pictures in easily understood terms. The booklet is available from the Superintendent of Documents in Washington, D. C.

Spraying. A thorough program for the spraying of every different fruit crop for control of pests is given in a recent bulletin from the Ohio Agricultural Experiment Station at Wooster. Information on sprays and how to use them is included.

Apples. It would appear that a person scarcely could be healthy and that few diseases could be cured without an abundance of apples, skin and all, in the diet, according to a bulletin by E. M. Todhunter, recently published by the Agricultural Experiment Station at Pullman, Washington. The skin of an apple, the author points out, contains from 2 to 10 times as much vitamin C as the flesh alone.

Cucurbits. In one of those outstanding productions of the State of New York which tell more than one ever dreamed could be known about vegetables, "The Cucurbits" is published as Part 4 of Volume 1 of "The Vegetables of New York." Peas, beans, and sweet corn have previously appeared. The present subject has been prepared by William T. Tapley, Walter D. Enzie, and Glen P. Van Eseltine. The history, systematic botany, and descriptions of several hundred horticultural varieties of squashes, pumpkins, muskmelons, and cucumbers are given, with 100 full-page (9 x 12 inches) colored illustrations.

Another imposing book on cucurbits has also appeared this spring, this one produced by the J. C. Robinson Seed Company. It is a 148-page loose-leaf illustrated catalog, which contains much useful information about these plants.

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* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Roses. Colored plates from catalogs illustrate this year's edition of the *American Rose Annual,* published by the American Rose Society at Harrisburg, Pa. Notes on rose culture, famous rose gardens, types of roses, and disease control are given.

Espaliers. Though espaliers are often difficult to establish in a country where there is not an abundance of summer moisture, home-owners who wish to try them will be interested in the article and diagrams for training fruit-trees against a wall in the April number of *Gartenschönheit.* Even those who can not readily read the German text will find the drawings extremely helpful.

Biography. A chapter from the life of "a renowned Africander, Christiaan Hendrik Persoon" is contained in the October 1937 Annals of the University of Stellenbosch. Written in the language of the Dutch settlers of South Africa, to those who can understand Afrikaans, it tells, through 100 pages of letters and other personal papers, the story of how the great mycologist was cut off from his expected patrimony and how his life was affected by his prolonged legal and financial struggle.

Forestry. Definite progress in advanced training among British foresters is noted in the Thirteenth Annual Report of the Imperial Forestry Institute of Oxford University, just issued. The report covers forestry work in all of the British possessions.

Chicory. The vegetable gardener will be interested in *Leaflet No. 133* of the United States Department of Agriculture, which tells how chicory and endive are most successfully raised. Also the leaflet explains what is chicory and what is endive, at least to the satisfaction of the purchaser of seeds and roots for the garden.

Snow Algae. Erzsébet Kol of Szeged, Hungary, who was a visitor at the Garden in 1936, investigating certain algae while she was here, is the author of a brief article in the February 15 Journal of the Washington Academy of Sciences in which she describes some new snow algae from North America. Miss Kol spent a year in America through the International Fellowship Crusade of the American Association of University Women.

Dialect. The *Journal of the Malayan Branch of the Royal Asiatic Society,* published in Singapore, devotes its entire issue of December 1935 (received some two years later) to a study of the Malayan dialect spoken in Trengganu. Rules for pronunciation and sample phrases for conversation are given.

Hemlocks. In Bulletin No. 19 of the Hemlock Arboretum at "Far Country" on the outskirts of Philadelphia, Charles F. Jenkins pleads for some advanced student to undertake as a doctor's thesis the subject, "Mutations of *Tsuga canadensis.*" To an approved student he offers certain facilities for the work, as well as a grant toward publication of the thesis.

Roadsides. Telling what property owners, as well as highway commissions, can do to beautify roadsides with appropriate trees, shrubs and flowers, the United States Department of Agriculture has issued a revised edition of Farmers' Bulletin No. 1481. Selections of plants for all parts of the country, with planting directions and numerous illustrations, are given, as well as the laws of each state regarding the planting of roadside areas. Abundant use of native material is recommended.

Wind. Experiments with a wind machine, reported in the *Bulletin of the Missouri Botanic Garden* for February, show that a basswood tree could not stand twice the normal wind during part of the day over an extended period of time. The tree wilted seriously and showed signs of imminent death.

South Africans. In the March issue of *American Home,* Virginia Richwagen tells how she has succeeded in raising South African plants in her garden by treating them all as tender annuals, "regardless of what the catalogs and labels recommend."

Annuals. Descriptions of half a hundred annuals and the best dates for sowing each kind accompany a plan for an

annual border in an article by T. H. Everett in *House and Garden* for February.

Vegetables. In the *Gardeners' Chronicle of America* for February, Raymond E. Smith describes some novelties in vegetables which he suggests planting this coming summer.

Seedlings. Monocotyledonous seedlings which have been found in certain dicots are discussed by Sir Arthur W. Hill in the January *Annals of Botany.* While he mentions plants in seven other families, he gives special attention to the Gesneriaceae.

Petrea. The twelfth in the series of monographic studies of genera of the Verbenaceae and Avicennaceae by Dr. Harold N. Moldenke appeared in the January and February numbers of Fedde's *Repertorium* with descriptions of 29 species of the genus *Petrea.*

Desert Plants. A well illustrated guide to the desert plant collection at the Huntington Botanical Gardens in San Marino, Calif., has recently been issued under the authorship of William Hertrich, Curator.

Philately. The appearance of plants and flowers in the designs of stamps and in their watermarks is described by H. S. Redgrove under the title of "Horticulture and Philately" in the *Gardeners' Chronicle* for March 19.

Uinta Basin. Edward H. Graham is the author of an extensive report entitled "Botanical Studies in the Uinta Basin of Colorado and Utah," contained in Vol. 26 (1937) of the *Annals of the Carnegie Museum.* He describes the physiography of the basin, its climate, altitudinal vegetational zones, and plant communities, and gives an annotated list of plants, besides plates, maps, and a bibliography.

Key. "A Leaf Key to the Florida Broad-leaved Trees" has been published by Mary F. Barrett of 57 Union Street, Montclair, New Jersey. This is the third helpful handbook brought out by this student of plant life. While palms are omitted, more than 600 other trees, native and exotic, are keyed, and drawings of about fifty different leaf types are presented.

Garden Club Book. A program bulletin of exceptional usefulness has been issued by the Garden Clubs of Arkansas under the direction of their educational chairman, Mrs. Robert Morris Seymour. As an aid in the season's study program of plant identification, the book contains illustrations of types of inflorescences and typical outlines of leaves and leaf arrangements, a selected list of plant families with familiar representatives of each, an extensive vocabulary of Latin names and their meanings, descriptions of orchids of Arkansas with their botanical names explained, definitions of descriptive terms used in manuals, and a helpful bibliography on botany and plant identification.

Auxin. From Holland comes a new study of a subject of both scientific and popular interest at the moment: those mysterious substances which cause roots to grow. Entitled "On Factors Determining the Auxin Content of the Root Tip," the paper, written in English by M. H. van Raalte, is published by the Botanical Institute of the State University at Utrecht.

Rio de Janeiro. Prospective South American travelers will enjoy the description of Rio de Janeiro's beautiful botanical garden, given by Dr. F. Lamson-Scribner in the January number of the *Scientific Monthly.*

Fruit. "Growing Fruit for Home Use" is the subject of *Circular 482* of the Agricultural Experiment Station at the University of Illinois.

Rhododendron Buds. In the Notes of the Royal Botanic Garden of Edinburgh for October, James Sinclair maintains that bud construction is of prime importance in the classification of rhododendrons. There are only two types, he says, convolute and revolute, and these are directly related to the lepidote and elepidote series in the genus.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Florida Flowers, Revised

FLORIDA WILD FLOWERS: An Introduction to the Florida Flora. Mary Francis Baker. 245 pages, illustrated with photographs by the author; indexed. Macmillan, New York. New edition, 1938. $3.50.

Mrs. Mary F. Baker in her new edition of "Florida Wild Flowers" has performed no mean feat of gardening; for she has made 800 trees, shrubs, and herbs bloom in a smaller space than that previously occupied by 700. This she has accomplished partly by condensing the index and printing it in smaller type than in the edition of 1926, and partly by tightening the descriptions of the plants, for her omissions have left out nothing of importance, and her re-wording has improved both coherence and literary style. Even fifteen new photographs have not added to the bulk, for they have been reproduced on the backs of some of the thirty-four in the first edition.

The plan of the book remains the same. The *Introduction* features the diversity of the flora. An *Explanation* defines flower, fruit, and leaf characters to be mentioned later. A few diagrams exemplify the parts of a flower; corresponding ones for flower clusters, fruits, and leaves would be helpful. A *Key* expressed in simple terms leads to the names of families and sometimes to those of genera. The *Description* of the families and their parts completes the book proper. The description contains summaries of the characters of families, genera, and species; keys to genera and species; and statements of habitat and geographical distribution. Interesting facts concerning morphology, uses, etc., are attractively presented.

A survey of the volume proves Mrs. Baker's assertion to the writer that a new edition would mean rewriting. Most pages show changes: petiole for leafstalk, Fabaceae for part of Leguminosae, re-arrangement of genera and new keys as in the Liliaceae, rewriting of keys as in the Orchids, the shifting of Lauraceae, Loranthaceae, and Olacaceae forward in the arrangement of families; and such omissions as that of *Pinus serotina*. Of course a host of additions will be found: *Pinus Taeda, Torreya taxifolia, Taxus floridana, Cordia Sebestena, Daubentonia punicea,* Cyrillaceae, two more species each of *Ilex, Aster,* and *Solidago*; and many more. Two of the most attractive additions are the common name of Osceola's plume for *Tracyanthus angustifolius* (crow-poison), and the inclusion of *Salpingostylis coelestina,* Bartram's Ixia. The latter flowers were locally called violets. They were lost to science for nearly 150 years after Bartram's discovery of them, because of their very early closing; but quite recently were found again by an early-rising botanist.

It is no compliment to Mrs. Baker to say that this is the best book of its kind; for it is the only one which treats of such a wide range of Florida wild flowers in a style which is scientifically accurate and delightful to read. Visitors to the state who are interested in the subject will find it simple and satisfying. Those who are unable to botanize in our far south will enjoy, as they sit by the fire, its attractive descriptions and pictures of unfamiliar species in familiar genera, made from life by one of Florida's best-known botanists.

MARY F. BARRETT.

Plants of Economic Value

ECONOMIC BOTANY. Albert F. Hill. 592 pages, illustrated and indexed. McGraw-Hill Book Company. New York. 1937, $5.

As an elementary introduction to the useful plants and plant products of the world, "Economic Botany" by Albert F. Hill is indeed a valuable contribution, both for students as a text and for the ordinary reader as an interesting non-technical discussion.

The book is divided into comprehensive sections under such titles as "Industrial Plants and Plant Products," "Drug

Plants and Drugs" and "Food Plants." Each section is subdivided into chapters of specific subjects such as: "Fibers and Fiber Plants," "Medicinal Plants" and "The History and Nature of Food Plants," and each chapter discusses in general the products, their source, history, and the process of preparation.

Unfortunately, citations are not given which would serve as an aid to a specialist, but that was apparently not the aim of the author. There is appended, however, a bibliography arranged under subject matter which would serve the specialist with more technical information. In addition, there is a systematic list of species that are discussed in the text, plus a general index to both Latin and common names of plants, including the general trade names of the products in present-day usage.

The interesting subject of our economic plant products stimulates an appreciation for our useful plants which civilization in general tends to take for granted. The book is highly recommended as an introduction to the vast subject of economic botany.

G. L. WITTROCK.

Rose-growing for All

HOW TO GROW ROSES. J. Horace McFarland and Robert Pyle. 191 pages, illustrated with drawings, photographs, and colored plates. Indexed. 18th edition, revised and enlarged. Macmillan, New York, 1937. $1.

Into a compact volume of less than 200 pages entitled "How to Grow Roses" J. Horace McFarland and Robert Pyle have packed considerable information on rose culture that will be of great help to the amateur or those seeking the first steps to rose growing.

The advice on the making of rose gardens and rose beds, soil preparation, planting, and attendant problems, is given in simple understandable language. In discussing the uses of climbing roses, however, the variety Mermaid has been given for an example. I do not think this was a wise selection for the amateur. Mermaid is rather difficult to grow in any situation even for the expert.

In a chapter on "How to Obtain Roses" a pertinent warning is sounded against the dangers of package roses and bench roses sold from greenhouses which are often foisted upon the public. There is also some good advice on disease and insect control as well as on pruning and winter protection.

P. J. MCKENNA.

Legends of Leaves

LEAVES, THEIR PLACE IN LIFE AND LEGEND. Vernon Quinn. 211 pages, illustrated with drawings by Marie A. Lawson. Indexed. Frederick A. Stokes Company, New York. 1937. $2.

Seldom have leaves been given such exclusive consideration as in this book by Vernon Quinn. Leaves, as such, constitute a decorative phase of our earthly landscape which most of us fail to appreciate fully. Insofar as leaves have been interwoven, through legend and superstition, with the history of a people, to such a degree might they be said to be also a social factor. And their practical uses are innumerable.

The style of the book is a bit monotonous, and smacks too much of a catalog if one reads for long at a time. The interesting stories and wealth of facts seem submerged by each other.

The charming sketches and chapter headings are a feature of the book. Artistically, they are excellently done, though they are often lacking in the accuracy of recognizable details.

W. M. PORTERFIELD.

A Book on Bulbs

BULBS FOR YOUR GARDEN. Allen H. Wood, Jr. 210 pages, illustrated, indexed. Houghton, Mifflin Co., Boston, 1936. $2.75.

Sensible and nicely put together, Mr. Wood's bulb book seems thoroughly practical—comprehensive too. Unfortunately, American books are nearly always boiled down until one wishes for detail rather than brevity; but I imagine most readers and publishers are not willing to pay for the extra information! However, this volume is so well arranged that it is fairly easy for the beginner to find out what he is anxious to know.

After an introduction on the care of bulbous plants, the seventeen chapters take up tulips, hyacinths, amaryllids, lilies, gladioli, dahlias, irises and their relatives, other bulbous plants, orchids, western bulbs, summer bloom, bulbs in the rock garden, window gardening, and growing bulbs from seeds.

ETHEL ANSON S. PECKHAM.

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, semi-annual, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twentieth volume. Subscription price, $10 a volume (two years). Not offered in exchange. Free to members of the Garden.

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DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

JUNE, 1938

THE FLOWER OF THE TULIP-TREE Cover photograph by Maizie Milland

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FLOWERS FOR ALL TO SEE

The tens of thousands of people who have visited the floral displays at The New York Botanical Garden during the past month prove by their very numbers the importance of one of the institution's most apparent public services.

While many of these people have come to observe and study the plants, to take notes on them for reference for their own individual gardens, the vast majority have come for the sheer love of the beauty of the flowers. To some, by their own admission, an annual visit to the display of their favorite flower at the Botanical Garden is an event, often the only way that the scent and color of flowers and the vision of living, growing plants is brought into their brick-walled lives in the crowded parts of the city. Others come weekly or oftener to watch the change in the gardens from one season to the next.

For all of these people, the sight of well grown plants in full flower brings a satisfaction, a joy, that is comparable to what some people experience in the presence of good music, art, drama, poetry, or prose literature. The difference is that many times the number of people feel pleasure at the sight of living plants as respond to any one of the arts here mentioned.

To make it possible for the public, without charge, to enjoy flowers growing outdoors and under glass the year around is one of the functions of the Botanical Garden. By means of memberships and gifts, the Garden is enabled to present its displays of thousands of varieties from spring through summer and fall, all winter, and into spring again for the appreciative public to see. The individual who shares in providing this type of service is privileged, for he is helping in a unique way to bring to the lives of many a joy that appears to be fundamental in nature.

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VOL. XXXIX JUNE, 1938 No. 462

New Varieties Feature The Rose Display This Season

IN mid-June occurs at The New York Botanical Garden the flowering of eight thousand plants of the finest roses, which the public is free to view daily from sunrise until dusk.

Rose Week is being celebrated from Sunday, June 12, through Sunday, June 18. At that time, when the roses are expected to be at their best, there will be an information desk at the Rose Garden where questions about the plants and about the Botanical Garden's activities will be answered.

Connoisseurs of roses for some years have recognized the garden in Bronx Park as an example of fine culture and as a collection extraordinarily complete in representatives of the various types and species of roses. This year, those who are familiar with it will see not only the reliable, almost everblooming plants which they have been noting for seasons past, but also about 125 new varieties, some of which, as yet unnamed, are appearing under numbers. They will find the plants as a whole in exceptionally fine condition, partly as a result of the new drainage system which was installed underneath the rose beds last winter. In the past many roses had been lost because of the poor natural drainage in the low area where they are planted.

It is the Garden's persistent work, beginning with deep preparation of the soil with incorporation of plenty of humus, that keeps the roses in such condition that they bloom almost continuously from June until November. The program of care and

Roger Lambelin is one of the new hybrid perpetual roses which may be seen at The New York Botanical Garden this year. The dark petals are curiously bordered with scallops of white.

(All photographs from J. Horace McFarland Company, by courtesy of Bobbink & Atkins)

Baronne Prevost is a new hybrid tea with large full flowers of pure rose-color, topping a plant with uniformly light green leaves.

culture involves a heavy application of cow manure and bonemeal in early spring; feeding with liquid manure in midsummer; cultivating the soil; spraying and dusting at regular intervals to keep mildew, aphids, black-spot, canker, and other troubles in check; applying acid phosphate in mid-July; ceasing the feeding and cultivating in time to allow thorough ripening for winter; suitable protection with mounds of earth when freezing weather comes; proper pruning at the right time for each type of plant; and dormant clean-up sprays when needed.

While such reliable roses as Mme. Leon Pain, Charles K. Douglas, Miss Rowena Thom, Mrs. Wakefield Christie Miller, Condesa de Sastago, Leonard Barron, President Herbert Hoover, Chateau de Clos Vougeot, Hofgärtner Kalb, Mrs. Sam McGredy, Gruss an Teplitz, Souvenir de Claudius Pernet, and many others, now seen year after year at the Botanical Garden, furnish the color motif for the rose display as usual, the feature this year is the large number of new introductions, all of which (like the other roses in the garden) have been contributed by Bobbink & Atkins, of Rutherford, N. J. At the end of this article are reference lists of some of the new roses of different types.

In a special bed will be a group of seven numbered roses which are the results of many years of breeding work done as a hobby by Dr. Whitman Cross, a geologist, of Chevy Chase, Md. The seven have been selected by Bobbink & Atkins from about fifty seedlings, largely of bedding types, which they considered especially worth while.

Another entirely new rose, also a bedding type without a name, occupies the center of the rose garden this year, replacing Paul's Scarlet Climber.

The rest of the climbing roses remain as before, with the addition of two new varieties, Glen Dale and Doubloons. The collection, which includes 97 different kinds, contains such outstanding names as Bloomfield Courage, Dr. Huey, Star of Persia, Evangeline, Ile de France, and Miss Flora Mitten.

The border of polyanthas is similarly complete, and contains such gems as Sunshine, which is golden-orange shading to pink; Helen Leenders, whose bright salmon buds open to light pink; Dorothy Howarth, with cup-shaped flowers of clear rosy-pink; Peach Blossom, of soft carmine-rose; Johanna Tantau, creamy

white; Salmon Spray, with vigorous branches of rich salmon-colored blossoms which are carmine-red on the reverse, and the remarkable Poulsen roses. The thirteen new polyanthas which were planted this year are listed on page 128.

Among the recently introduced hybrid teas at the Botanical Garden is Break o'Day, the product of the hybridizing skill of the Brownells of Rhode Island. Introduced by Bobbink & Atkins in 1937, it is said to be the forerunner of a new race of extremely hardy, strong, floriferous roses. Lily Pons, of this group, will be introduced in 1939.

Golden Frills, which came out in 1936, is a sport of Feu Joseph Looymans which was found in the Bobbink & Atkins fields bearing golden-yellow flowers on a stronger, freer-flowering plant than its parent. Texas Centennial, one of the outstanding roses of 1936, and Baronne Prevost, a vigorous, hardy plant bearing large full flowers of pure rose-color, are some of the other novelties.

While the hybrid teas, with 220 varieties, make up the greatest part of the rose garden, the planting this year contains one of the most complete collections of hybrid perpetuals to be found in America. The 46 new varieties, three plants of each of which were added this spring, bring the total number of varieties to 105. More vigorous than the hybrid teas, with larger and heavier flowers which are more fragrant and, while they last, more numerous, the hybrid perpetuals have only recently become well known in America, although they have been favorites in Europe for many years. One of the new introductions here, called Louise Crette, closely resembles Frau Karl Druschke, except that the inner side of the petals is yellow. Roger Lambelin, another novelty among the hybrid perpetuals, has scalloped petals curiously edged with white. Ferdinand Pichard has alternate stripes of varying tones of red and pink. Oskar Cordel is a fragrant bright carmine flower. Her Majesty, of deep pink, has been described as the largest rose in existence. Its greatest rival at the Botanical Garden is Arrillaga, which was planted at the entrance to the rose garden five years ago and which has since produced an unbelievable number of enormous, handsome pink flowers.

A number of newly patented hybrid teas were brought into the garden this year and placed in a separate bed. They include:

Break O'Day is a vigorous hybrid tea rose produced by the Brownells of Rhode Island and introduced by Bobbink & Atkins in 1937 as a forerunner of a promising new race.

Golden Frills is an attractive yellow hybrid tea, which is a sport of Feu Josepl Looymans.

Alice Harding
Carillon
Dorothy McGredy
McGredy's Pink
Eclipse
Golden Main
Rome Glory
Saturnia
Mme. Jean Gaujard
Amelia Earhart
Countess Vandal
McGredy's Triumph
McGredy's Sunset
Gloaming
Signora
Mrs. Francis King
Miss America
Viscountess Charlemont

The new hybrid perpetuals include:

Felbergs Rosa Druschki
Ferdinand Pichard
General Baron Berge
Georg Arends
Gloire Lyonnaise
Heinrich Schultheis
Hugh Watson
Jean Liabaud
Leonie Lambert
Louis van Houtte
Louise Crette
Marchioness of Lorne
Marie Baumann
Mme. Elise de Vilmorin
Oberhofgärtner Singer
Peony of Fragrance
Pride of Waltham
Prince Arthur
Princesse de Bearn
Rembrandt
Robert Duncan
Roger Lambelin
Ruhm von Steinfurth
Senateur Vaisse
S. M. Gustave V
Souv. de Wm. Wood
St. Ingebert
Symphony
Thomas Mills
Triomphe de l'Exposition
Victor Hugo
Victor Verdier
Cardinal Prituze
Charles Gater
Chot Pestitele
Coronation
Duke of Edinburgh
Dupuy Jamain
Her Majesty
Jeannie Dickson
Marchioness of Londonderry
Marquise de Castellane
Mlle. Eugene Verdier
Mrs. J. F. Redly
Anne Crawford
Comtesse d'Oxford

The new polyanthas which have been added to the border on the west are:

Betty Prior
Distinction
Eva
Feuerschein
Fortschritt
Orange Triumph
Pink Charm
Dagmar Späth
Dance of Joy
Gartendirektor O. Linne
Geschwinds Unermüdliche
Peach Blossom
Trompeter von Säckingen

Propagation of the Native Species of Chimaphila

By Robert S. Lemmon

THE two species of *Chimaphila* native to our dryish eastern woodlands, *C. umbellata* and *C. maculata,* are so attractive with their handsome evergreen foliage and intensely fragrant July blossoms that countless attempts have been made to transplant them from the wild. Occasionally such efforts have succeeded, but in the great majority of cases complete and more or less prompt failure has been the result.

A rather intensive study of these two plants over several years has led to certain conclusions with respect to their reproductive peculiarities and the methods whereby they can be propagated and developed for transplanting purposes. Briefly, and from a purely practical rather than a scientific standpoint, here they are:

In their natural habitat the Chimaphilas set an abundance of extremely small seeds which ripen late in October and have all left the capsules by December. For whatever reason or group of reasons, very few of these seeds ever produce plants; a careful search of a stand containing a hundred or more clumps and single-stalk plants will reveal not more than one or two seedlings.

The normal method of increase in the wild is by underground runners very sparsely furnished with feeding rootlets. Often these runners extend for several feet, sending up at varying intervals shoots which gradually take on the stature of mature plants and, in time, develop a few additional active roots. During the life of these apparently distinct plants each of them appears to be largely dependent upon the network of hidden runners which connects it with its fellows. Hence one of the great difficulties with transplanting.

In my attempts to germinate seeds a long series of experiments was tried with different sowing media, exposures, degrees of moisture and light, temperatures, age of seeds, and so on. The results were completely negative, and I next turned to runner divisions.

Here, again, little was accomplished, although a few weakly plants were eventually produced from tip sections laid flat in a sand-peat mixture and kept moderately damp in a closed shaded frame.

At the same time a series of top-growth cuttings, taken at two-week intervals from May 1 until November, was run in an unheated outdoor propagating frame, half in sand-peat and half in sand. Some were old wood, some of new wood with old-wood heel, and some of the new wood without heel. All failed to strike even a single root except those of new wood with about a 3/16" heel—"stub" describes it better—taken just before the young leaves reached full size. With these last a strike of from 75 percent to 80 percent was obtained, the higher figure being for *C. umbellata*.

Subsequent experience has confirmed those results of two years ago and provided some further details. For example, the sand medium is slightly better than sand-peat, for both species. Again, although most of the cuttings do not root until they have passed a summer and winter in the frame (incidentally, with their foliage in perfect condition all that time), development is fairly rapid once it starts. Also, here in Connecticut, the best time for taking cuttings, in a normal season, is July 1 to 10; before and after these dates the percentage of strikes drops off sharply.

After their root systems are well developed the cuttings are potted off into a sandy, acid leafmold with a pH reading between 4 and 5, in peatmoss pots. They are then plunged in peatmoss in practically full shade, kept moderately watered, and set out in their permanent places the following spring, pots and all.

The Flowering Behavior Of Norway Maples

By A. B. Stout

THE flowers of the Norway maple (*Acer platanoides*) are rather small (about ½ inch in diameter) and of a subdued yellowish green color, but they are produced somewhat in advance of the leaves and in such abundance that a tree in full bloom presents a mantle of flowers that is indeed conspicuous. But still more noticeable, perhaps, is the accumulation of flowers which forms a veritable carpet under a tree at some time during the flowering period. Possibly this fall of flowers may arouse one's interest. If it does and some rather simple observations are made an absorbing story is revealed regarding a most fundamental law of reproduction.

The flowers which fall in great number from the trees of the Norway maple are staminate, or male. They have well developed stamens which shed pollen, but the pistil in each flower is so rudimentary that the flower is not able to develop into a fruit with seeds. These male flowers fall after their pollen has been distributed.

At the time when the male flowers have accumulated on the ground one will find other flowers in considerable number on the tree; but in these the stamens are rudimentary while the pistils are well developed; they are therefore pistillate, or female.

Thus the individual tree produces both male and female flowers. Usually both kinds are in each of the many clusters of flowers over the entire tree. Such a plant is called *monoecious*.

In the Norway maple the two kinds of flowers do not mature at the same time. By continuing the observations daily for the entire period of flowering one will find that certain trees will have only male flowers during the first week or ten days of flowering. Then the male flowers will begin to fall and a set of female flowers will mature during a period of about a week. Thus there is a separate season of maturity for each of the two kinds of

At some time during the flowering of trees of ***Acer platanoides*** *many flowers fall and form a veritable carpet under a tree. These are male flowers which are dropped after the pollen is shed. Several thousand of these flowers are shown here, but they are only a small portion of the total which had fallen from a single tree.*

flowers on a tree. Trees of this class possess what may be called a male-female sequence in their flowering. *This condition limits or even entirely prevents close-pollination;* that is, the pollination of female flowers by pollen from male flowers of the same tree is practically prohibited. It will be recognized that there will also be no cross-pollination between different individual trees which have the same male-female sequence except when the calendar dates do not coincide and the period of maleness of one overlaps the femaleness of another.

The maturity of the stamens and the pistils at different times in a single perfect flower was first definitely described by Sprengel in 1793 and he applied the term "dichogamie" to this condition. In the Norway maples the dichogamous development of the two sexes in the various unisexual flowers extends to a tree as a whole.

When the observations are extended to several trees one soon notes that there are some trees whose flowers develop in the female-male sequence and some with male-female sequence.

Thus there are two main groups or classes of individuals in a population of the species *Acer platanoides*. Each tree of each group is a hermaphrodite but the dichogamous development of the male and female flowers on a single tree limits self-reproduction. This condition also operates to limit intra-group cross-reproduction. For individuals with the same sequence the opportunity for cross-pollination is greatly reduced. But the members of the two main groups are reciprocating in the relations which provide the pollinations necessary for reproduction by seeds. During the first part of the flowering period the trees which have the male-female sequence provide pollen for the pollination of trees in the female-male sequence. Some ten days later the pollen from trees of the female-male sequence may function in the pollination of trees which have the male-female sequence.

Thus in reproduction in the Norway maples there is cross-pollination between members of two groups or classes that are different, at least in respect to the sequence of the flower behavior. Since these differences are inherent and hereditary the reproduction may be termed bi-genotypic.

There are several conditions in both animals and plants which enforce or compel bi-genotypic reproduction. When a species is composed of unisexual male and female members, as is the rule

*Flowers of the Norway maple, about one-half natural size, taken from two trees at the same calendar date and at a time about midway in the entire period of flowering. **At right**, a typical cluster from a tree with the male-female sequence; the male flowers are closed, their pollen is already shed, and they are about to fall; the female flowers are almost mature. **At left**, a typical cluster of flowers from a tree of the female-male sequence; the male flowers are now ready to shed pollen but the female flowers have already been cross-pollinated and fruits are starting to develop. The two sequences of development provide for the reciprocating cross-pollination necessary for reproduction.*

in animals, it is obvious that members of the two classes must collaborate in reproduction. But this principle also operates in many plants that are hermaphrodites through the action of conditions which limit both self-reproduction and intra-class reproduction and which force inter-class reproduction. This is accomplished in hermaphrodites (1) by incompatibilities in fertilization, (2) by the adaptations of heterostyly, that is, the possession of styles of different lengths, (3) by the development of the pistils and the stamens in perfect flowers at different times (as in avocados), and (4) by the seasonal alternation of sex with reciprocation, as seen in the Norway maples. The extent to which these conditions are developed in hermaphrodites seems to indicate that within a species *nature revels in bi-genotypic reproduction.*

The various limitations to self-reproduction were much emphasized some 75 to 100 years ago in the doctrine that nature abhors self-pollination and self-reproduction. But this view does not recognize that any condition which limits selfing also limits crossing within the class of which the individual is a member and that cross-reproduction between individuals that are fully alike is

thus limited. The particular cross-reproduction which is most effective and most fully provided for is that which is bi-genotypic.

The main facts regarding the reciprocation in the flowering sequences of the Norway maples may readily be observed. Male flowers are readily distinguished from the female flowers by the relative abortion of either the pistil or the stamens. The trees which have the male-female sequence shed flowers in the mid-period of their flowering; the trees which have the female-male sequence shed the male flowers at the close of their flowering period. The series of rather simple observations here suggested when properly related reveals the operation of a most fundamental principle of sexual reproduction: that even in hermaphrodite plants reproduction is often necessarily bi-genotypic.*

Trapa bicornis, a Water-chestnut Known to the Chinese As Ling Ko

By W. M. Porterfield

(No. 3 of a series on Chinese Vegetable Foods in New York)

ONE day on Broadway I observed a small group of people interestedly looking at something a hawker was exhibiting. He had in his hand an ordinary drinking glass filled with water and on the surface was floating a flower of *Lilium speciosum* to which was attached a slender curving stem that seemed to spring from a blackish two-horned object at the bottom of the glass. From the curved stem a couple of finely divided leaves floated gracefully away into the water. They looked something like the submerged leaves of *Trapa,* but may have been those of *Myriophyllum.* Altogether this was a wonderful plant and the man explained to the open-mouthed spectators that anyone could have it for twenty-five cents. That horned object at the bottom of the glass, he told his onlookers, was a "rare nut from China" which, he urged them to believe, produced this lily. As a matter of fact,

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* The observations reported above were first completed by the writer in 1928. A more detailed study of the variations in classes and in the reciprocations in the flower behavior in a population of Norway maples has more recently been made by a research student of The New York Botanical Garden, but not yet prepared for publication. The individual variations further revealed by this study are not here reported or anticipated.

the two-horned object *was* a nut and it came from a Chinese plant, though not a rare one, and it certainly was not responsible for the lily flower. It would take more than ordinary technique to produce such an effect.

The nut had come from the plant commonly called the water-chestnut or horn-chestnut, sometimes also buffalo-head fruit,[1] and known botanically as *Trapa bicornis*.[2] It is native in China. Another species, *Trapa bispinosa*,[3] the Singhara nut which grows in Ceylon, has two (sometimes four) short slender spines in place of the pronounced horns of the Chinese plant. It is extensively eaten by the natives in that country, but does not seem to be as well known here as the Chinese species.

The Chinese name for this nut is Ling Ko. It can be bought cheaply in Chinatown in New York where it is commonly known as the water-chestnut. Dealers in aquatic plants also carry one or another species of *Trapa,* as they are suitable for culture in aquaria, tubs, or pools.

The water-chestnut grows naturally in stagnant water. When the nut germinates, the stem develops both floating and submerged leaves similar to those seen in the photograph reproduced here of the drawing of *Trapa bispinosa*. The floating leaves arrange themselves in an artistic mosaic pattern of radial symmetry and their petioles are swollen to form air bladders that keep the upper part of the plant afloat. The submerged leaves are laterally dissected into capillary segments. The fruit is an edible nut which resembles the head of a water buffalo with its two large curved horns. These horns are smooth, but are quite coarse as compared with the two straight slender barbed spines of *Trapa bispinosa*. When ripe the nuts fall to the bottom of the pond where they remain all winter, as they must be kept moist to retain their vitality.

Robert Fortune[4] (1852) tells of the manner of collecting the horn-chestnuts in the shallow waterways connected with the Tai Hoo Lake in Kiangsu province. Apparently women and boys embark in tubs resembling our ordinary wash-tubs and push their

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[1] Williams, S. Wells. The Middle Kingdom I. 364. 1883.

[2] *Trapa bicornis,* which normally bears two horns, has been incorrectly reduced to synonymy under *T. natans,* which has four spines, in the *Index Kewensis*.—E. J. Alexander.

[3] Roxburgh, Wm. Flora Indica I. 449. 1820.

[4] Fortune, Robert. A journey to the tea countries of China. 27. 1852.

Water- or horn-chestnuts (Trapa bicornis), natural size. The character for the Chinese name, Ling Ko, appears in the upper corner.

way among the masses of plants without hurting them. They gather the nuts as they go and altogether present an amusing picture doing it. Fortune has given us a colored plate depicting such a scene on one of the canals. The inevitable humorous side comes out where in the background one luckless picker has reached over too far and his tub is turning over.

According to Bretschneider,[5] Martini's Atlas, published in 1655, contained one of the first references to the horn- or water-chestnut, *Trapa bicornis*. There is also a four-spined European species, *Trapa natans*, which has become naturalized in a few places in eastern United States, apparently through its use as a decorative aquatic plant. It is called water caltrops or Jesuit's nut as well as water-chestnut.

The name caltrop, like the generic name *Trapa*, is abridged from the Latin "calcitrapa" which refers to the spreading points on the fruit. The term "caltrop" was applied to a small bronze or iron ball from which projected sharp spikes, usually four in number.

[5] Bretschneider, E. Early European researches into the flora of China. Journ. N. China Br. Roy. As. Soc. 15:7. 1880.

Caltrops were used in ancient times in warfare when foot soldiers wished to slow up a cavalry charge. When caltrops were strewn over the ground the horses tramped on them and were thus incapacitated. From their resemblance to these metal inventions of the devil the name caltrops was given particularly to the four-spined species, *Trapa natans*, and sometimes to *Trapa bispinosa*.

As explained in a previous paper[6] the name water-chestnut has also been given to the edible corm of a sedge, which has long been known as *Scirpus tuberosus*, though *Eleocharis dulcis* is the botanical name under which this Chinese water-chestnut should be known today.[7]

Both "water-chestnuts" are well liked by the Chinese for food. In fact, *Trapa bicornis* is sometimes included among the five important foods of the Chinese people.

Though in taste they remind one of the chestnut, my own preference supports that of Dr. Clark Abel[8] (1818), naturalist to Lord Amerherst's embassy to the court of Peking, which is that the corm of *Eleocharis dulcis* is more prized than the nuts of *Trapa*.

The starchy content[9] of the fruit of *Trapa bicornis* in its dry state is 67.5 percent, with 12.1 percent protein and 11.6 percent albuminoids constituting the other chief compounds. The usefulness of the horn-chestnut for medical purposes was pointed out in the ancient authority, Pen Tsao Kang Mu. This herbal of medicinal plants, published in 1590 by Li Shi-chen, furnished a good description of the plant, its fruit, and the uses made of it. Williams points out that the nuts are sold on the street after being boiled. The reason that boiling is always recommended for this fruit is that if eaten raw, it is supposed to be harmful to the digestive tract.[10] It is said also that it will produce worms and

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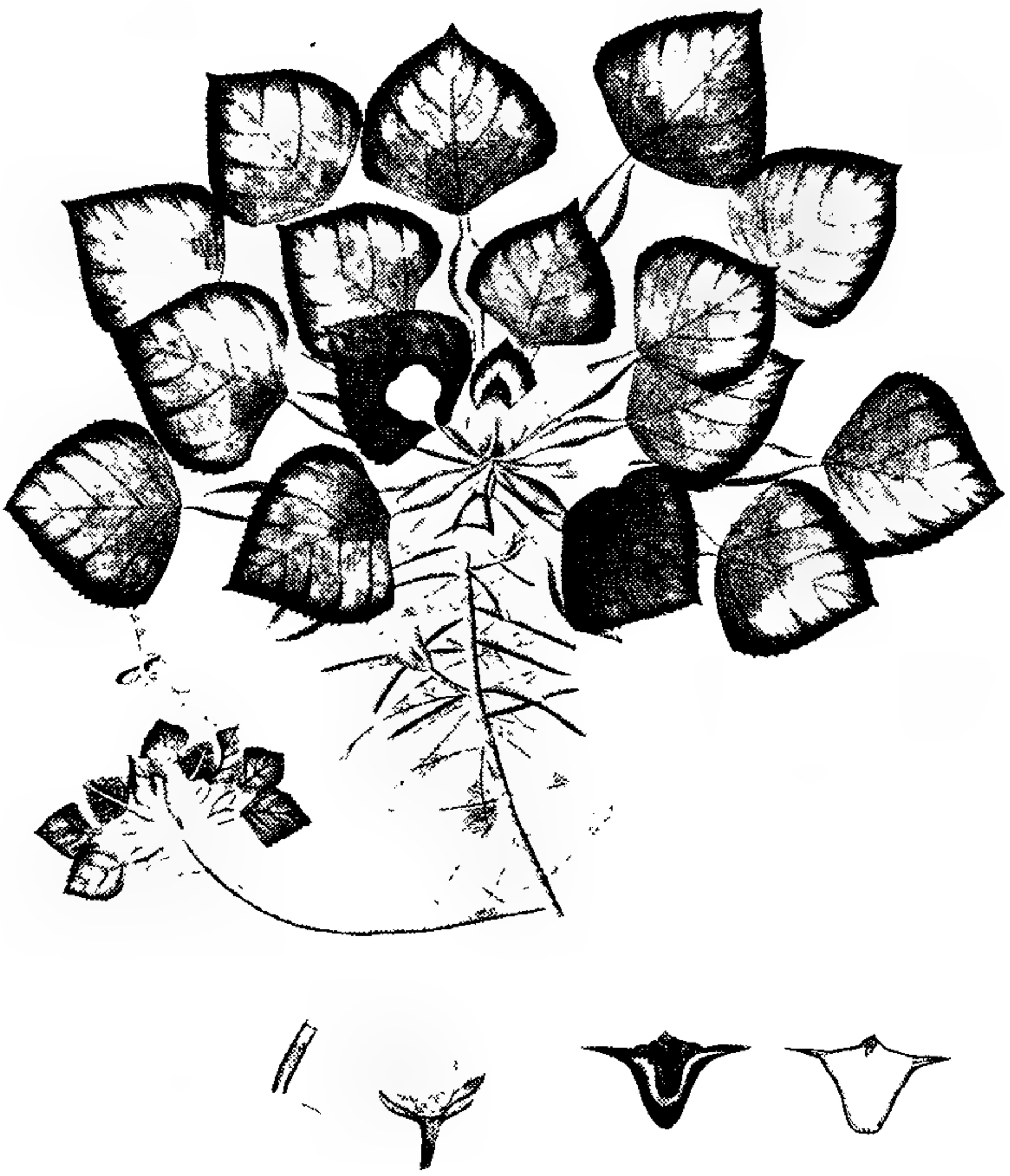
[6] Journ. N. Y. Bot. Gard. 39:32. 1938.

[7] *Scirpus tuberosus* is the botanical name which William Roxburgh used in publishing the first illustration of the plant in 1819. In 1917, however, E. D. Merrill (An interpretation of Rumphius's Herbarium Amboinense. 104), revived the name *Eleocharis dulcis* of Trinius, published in 1833 and based upon the name *Andropogon dulce* of Burmann, dating originally from 1768. Merrill was doubtful about the identity of *E. dulcis* with *E. tuberosa* (the *Scirpus tuberosus* of Roxburgh) but H. K. Svenson in 1929 (Rhodora 31:158) accepted the identity of the two species without question.—J. H. Barnhart.

[8] Bretschneider, E. History of European botanical discoveries in China. 229. 1898.

[9] Blasdale, W. C. A description of some Chinese vegetable food materials. U.S.D.A., O.E.S., Bull. 68:40. 1899.

[10] Stuart, G. A. Chinese materia medica. 440. Shanghai. 1928.



Trapa bispinosa, as illustrated in Plate 234 of William Roxburgh's Plants of the Coast of Coromandel, showing the typical growth habit of members of this genus of useful aquatics.

intestinal disorders. Considering the filthy character of the ponds in which it is grown, it is no wonder that eating it raw inevitably brings digestive troubles. When boiled, however, it is nutritious and beneficial. Because it is grown in the water, its virtues as enumerated by the early writers are: relieving thirst, reducing fever, and being helpful in cases of sunstroke. The flowers and shells of the fruits can be used in making an astringent from which a dye for the whiskers is obtained.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

The Plant Literature of Eastern Asia

A BIBLIOGRAPHY OF EASTERN ASIATIC BOTANY. Elmer D. Merrill and Egbert H. Walker. 719 pages, indexed. Arnold Arboretum, Jamaica Plain, Mass. $12.50.

When any conscientious student undertakes research, he feels the necessity of learning all that he can about what others have done in his chosen field. Hence the importance of good bibliographies in the equipment of every scientific workshop. Rarely, indeed, has a work of this kind covered its field so thoroughly and accurately as in the case of this volume. Of quarto size, printed in small type, with two columns to the page, it contains more than 21,000 main entries, under authors' names, besides five classified indexes.

It comprises a very complete record of the books and papers dealing with plants of China and Japan, and the important ones relating to adjacent regions, down to the end of the year 1936. Not the least valuable feature is the inclusion of writings in the Chinese and Japanese languages; for the special appendixes devoted to the older oriental works, the oriental serials, and the oriental authors, it was necessary to borrow type from China, although the printing was done in Baltimore. Similar lists of Russian serials and Russian authors would have been desirable, and type for the Russian characters would have been less difficult to secure.

Although circumstances have necessitated the publication of this great work by the Arnold Arboretum, most of the preparation of the manuscript was done while the senior author was Director of The New York Botanical Garden, from 1930 to 1935, and the utilization of the library facilities of the Garden has continued since that time.

Minor errors in a work of this character are unavoidable, and do not necessarily interfere with its usefulness. In an interesting paragraph on misleading titles, in the introduction, is a reference to William *Gambill*; in the corresponding entry under Nuttall, on page 359, he is called William *Gambell*. Neither is correct; the name was *Gambel*. But the authors "crave the indulgence of those who detect errors and omissions," and they are certainly entitled to such indulgence, after their years of devotion to this great task.

J. H. BARNHART.

Modern Note in a Biological Text Book

HIGH SCHOOL BIOLOGY. Ralph C. Benedict, Warren W. Knox, and George K. Stone. 723 pages, illustrated, indexed. Macmillan, New York. 1938. $2.

A young student came to the desk triumphantly with High School Biology in his hands. He had found it in a public library and was fascinated by the picture on page 544 of the large salivary chromosome of Drosophila showing the gene positions.

Now for a student to discover a text book is akin to a postman discovering a pleasant walk on his holiday or a vacationing bus driver an automobile ride, and the tribute deserves an inspection. There are many pictures in the book to excite the interest and satisfy the curiosity of that young student and of others —for the illustrations in High School Biology are outstanding. They are large, clear, many of them actual portraits and photomicrographs, and most of them timely and modern in note. It is very winning to have a sound nervous system illustrated by a portrait of Donald Budge in a tennis stroke. Dr. Benedict himself stands as a contrast to an eight-foot tree kale. Vitamin crystals, Shiva temple and Jimson-weed seem to have moved from

the front pages of biological news to the pages of this book.

The text, which is greatly enhanced by a large and legible type, is excellent reading. It is clear and direct, scholarly without being pedantic. The chapters are, with few exceptions, not more than ten or twelve pages long and well-knit in content. The book is divided into nine units of study. I am reminded here of the student who, when asked the difference between the words *logical* and *pedagogical* replied without hesitation, "*Pedagogical* is the way a teacher does things and *logical* is the sensible way." The authors of this book manage to be both. There is within each unit a development of subject matter from the simple to the complex, and yet the book begins with Man in a unit called *Man is One of Millions of Kinds of Living Things*, and then after some six hundred pages reaches Man again in the final unit called *Human Progress is a Biological Phenomenon.*

This text, so rich in content, should be useful in almost any course in high school biology, whatever the syllabus. One cannot help wondering, however, whether the millenium is here, that our thirteen and fourteen-year old boys and girls are expected to concern themselves with genetic aberrations, polyploidy, lethal factors and inheritance in walnut-combed fowl. It must be a long time since our authors, as teachers, have had presented to them "*jeans*" for "*genes*," "*fuss*" for "*fuse*" and "*salvia*" for "*saliva.*" The text seems in many places much too much for students of the ninth and tenth year. But it is an excellent book and I like it.

LUCY ORENSTEIN,
Evander Childs High School.

900 Years in England

THE ENGLISH GARDEN. Ralph Dutton. 122 pages, illustrated, indexed. Scribner, New York, 1938. $3.

In this book of 118 pages of reading matter, plus 158 illustrations, the author tells his story. The book is made up in five chapters as follows:

1. Introduction.
2. The search for sustenance 1066-1500.
3. The age of symmetry 1500-1720.
4. The return to nature 1720-1900.
5. Features and follies.

One does not look far into the book before reaching the conclusion that the author is not a gardener or he would have detected in illustration No. 2, "Early Summer in the Garden," a sheer impossibility. This illustration is of a fine full-flowered specimen of *Magnolia conspicua*, which flowers in April in England as well as in the U.S.A. Also, in the introduction on page 6 it is laughable to read of a tendency in Victorian days to "cut up their lawns with many sided flowerbeds and clumps of laurel, orcuba, or ponticum."

Enough said to disclose that the author lacked horticultural knowledge to implement himself to write "The English Garden." As an antiquarian and historian he has qualifications extraordinary. He has eminently succeeded in culling and condensing into quite a small book about 900 years of gardening practice which may be worth while for those who want to touch the high spots only.

There is nothing in this new book we have not known before *in extenso.* Like all writers who try to portray the past he trots out our early landscape men such as "Capability" Brown, Humphrey Repton, Uvedale Price and others. Surely in their day and generation they did some great work, especially if we are competent to bear in mind the limited range or choice of planting material then available. Little need be said as to the varied illustrations. Many of them we have seen so often in other publications as to recognize them without captions.

I really read the book carefully and thoughtfully from cover to cover, hoping eventually to come to some soul-satisfying redeeming feature to justify the title of the book. Suppose the author had contented himself historically at 1850, and given us a chapter from then to 1930, showing us how the large gardens had been immensely beautified, also the amazing development of smaller gardens appropriate to smaller homes. Moreover, when is a garden not a garden? Since the last chapter's closing date is 1900, how about those tens of thousands of country-wide cottage gardens so full of charm and interest, small in area, yet not entirely flowerless the year around? The period for the chapter which might have been is summed up on page 99 in about 12 lines with a casual mention of the influence for better gardening of the late William Robinson and the late Miss Gertrude Jekyll.

ARTHUR HERRINGTON.

Dianthus Descriptions

THE GARDEN OF PINKS. L. H. Bailey. 142 pages, illustrated, indexed. Macmillan, New York. 1938. $3.

Gardeners have so long stood in need of a guide as to the "which is which" of their pinks that this one is a veritable godsend. It is the first since the publication, some fifty years ago, of Williams' studies, which seem never to have had a wide, popular distribution and are now rather hard to come by.

The Garden of Pinks should help greatly to remove the prevailing confusion of names and kinds. It will delight the studiously minded, and fool the unscholarly into learning. For here is information of a most valuable kind, served up, not like so much medicine, but as sparkling wine, for which the vintner be thanked.

Such things a reviewer might say, and not have read the book. But we have read and tentatively digested the contents. We delight in this opportunity to check and correct many of our garden labels. Yet, reading about plants has developed in us a faculty of unbelief, which prompts us, even now, to leave certain of our labels unchanged.

One of them is that of *Dianthus sylvestris*, which we mean to leave with the "dwarf form, about 3-5 in. high," indicated in the Enumeration under variety *frigidus*. Though this small form is commonly known under the specific and varietal names of *frigidus* and *inodorus* (see Farrer's illustration in his English Rock Garden), we take it to be typical *D. sylvestris*,—the smaller of the two forms originally described under the specific name by Von Wulfen and illustrated by Jacquin.

We can have no peace with the name var. *frigidus* Williams, either for this or any other plant. The original record of the name *frigidus*, by Zuccarini, in "Flora", appears to us to be invalid. It is not accompanied by a description, and is credited to Koch, who never published it, but described the plant referred to by Zuccarini, subsequently, under the name var. *subacaulis*. This name, which is employed by Hegi, appears to us preferable; and all the more so because the other has become attached to the typical *D. sylvestris*.

Dr. Bailey's use of the name var. *frigidus* is derived from Williams, who made the double error of describing the plant as a Hungarian form, and of citing a *D. frigidus* Kitaibel. No such *Dianthus* species was ever published by Kitaibel. The plant referred to by Zuccarini, in Flora, was later described amply by Koch as an extremely dwarf, almost stemless form, found on the Seizer Alpe. It appears never to have been reported authentically from outside of the Bozen district in the Tyrol. We have never met with the plant in gardens.

Speaking of *D. sylvestris*, it appears to us that, in the text, and in Plate 43, the petals of this species are not happily represented as unqualifiedly contiguous. In our observation (supported by Jacquin's plate), they are, typically, not or barely contiguous.

These detailed reservations do not detract from the really great value of this guide to the pinks. They are merely illustrative of the interest which the critical reader will find in digesting the contents. That, we take it, is quite in line with the author's intention to furnish practical guidance to a multitude of gardeners and to stimulate inquiry on the part of a smaller number of the studiously minded. The book promises to attain both these ends.

P. J. VAN MELLE.

A Good Mushroom Guide

FIELD BOOK OF COMMON MUSHROOMS. William S. Thomas. 369 pages, illustrated, indexed. Putnam, New York, 1936. $3.50.

It is gratifying to all those enthusiasts who so ardently search the woods and fields for what McIlvaine calls "their little friends, the toadstools," to find a new edition of Dr. William S. Thomas' Field Book of Common Gilled Mushrooms, published by G. P. Putnam's Sons. The book now appears under the title of Field Book of Common Mushrooms, Dr. Thomas having added an appendix containing a number of genera of other fleshy fungi. These include, among others, the polypores, which bear their spores in tubes instead of on gills, the hydnums, or those having spore-bearing spines, the puffballs, the corals, and also a few of the group having spores in sacs. This last group contains the morel, so eagerly sought for each spring by all mycophagists. This mushroom is deservedly popular, for it is easily distinguished from all poisonous species and is of remarkably fine flavor when cooked.

In this handy little volume the excellent arrangement of the text, the carefully worked-out keys and the fine illustrations by Mary Eaton have been thoroughly appreciated by all naturalists who have studied the book. The new material in this second edition makes it of great additional value, for the groups included contain many species of great beauty of form and color and also many which are delicious as food. Robert Snedigar's clear, bold line drawings ably illustrate Dr. Thomas' simple, untechnical descriptions.

The collection of recipes for mushroom cookery will delight the gourmet as well as the discerning cook over the camp fire.

MARGARET MCKENNY.

Current Literature At a Glance*

By Carol H. Woodward

For Garden Clubs. The National Council of State Garden Clubs, Inc., at 30 Rockefeller Plaza, New York, has just published a 32-page booklet by Sarah V. Coombs on horticultural programs and horticultural work suggested for the use of garden clubs. Mrs. Coombs has included questionnaires on botany, horticulture, and cultivation, as well as outlines of special projects and suggestions for study.

Hayfever. Plants which cause hayfever in the Middle West are illustrated and described in a 52-page planographed booklet by Norman C. Fassett of the University of Wisconsin, Lester McGary, and Laura F. Bates, all of Madison.

Wisconsin. Norman C. Fassett is also the author of a new pocket manual of 176 pages covering the spring-flowering plants of Wisconsin.

Lichens. One of the leading papers in the Annals of the Missouri Botanical Garden issued in April is an account of the lichens and lichen parasites collected by Paul A. Siple on the second Byrd Antarctic expedition. Carroll W. Dodge and Gladys E. Baker, the authors, have enumerated 84 new species out of the 89 species which were collected. In a table they give information on all the collections of lichens made in the Antarctic since 1839.

Air Exploration. "Collecting Alpines by Air" is the title of an article by Warren C. Wilson in the April *National Horticultural Magazine,* in which a month's trip over the mountains of western North America is described. The purpose of the journey, the author states, was to gain a knowledge of American alpines in the wild and to test their behavior under cultivation. He mentions 72 showy or otherwise desirable species with horticultural possibilities.

Mushrooms. A useful leaflet published as Bulletin 386 by the New York State College of Agriculture at Ithaca is entitled "Some Mushrooms—Edible and Poisonous" by W. W. Ray. Its 15 pages are well illustrated with photographs.

Nutmegs. The issue of *Brittonia* which appeared in May is devoted entirely to a study of American species of Myristicaceae (the Nutmeg family) by A. C. Smith in collaboration with R. P. Wodehouse.

History. An attractively bound little book entitled "Dr. Hosack's Garden" has been issued by Rockefeller Center. It describes the historic Elgin Botanic Garden, which occupied that site from 1801 to 1811.

Photosynthesis. To select the right experiment which will reveal the mechanism of photosynthesis is one of the tasks —and admittedly probably the most difficult one—which the C. F. Kettering Foundation for the study of chlorophyll and photosynthesis has set for itself. From its headquarters at Antioch College, Yellow Springs, Ohio, comes a published report of the history and the general plan for the future of the foundation, which is headed by Ondess L. Inman.

Andes. T. H. Goodspeed is reporting in recent numbers of the *New Flora and Silva* on the Andean plant expedition of the University of California.

Forests. "Green Gold" is the title used by R. Neumann Lefebvre in giving a history of America's forests, their waste, and the present attempt to restore them. He writes in *Natural History* for May.

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* All publications mentioned here and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Rare Shrub. Attempts are being made to bring one of America's little known native ornamental shrubs into cultivation, says William A. Knight of Biltmore Forest, N. C., in the Arnold Arboretum *Bulletin of Popular Information* for April 22. The shrub is *Elliottia racemosa,* which is confined to a restricted area in eastern and southern Georgia.

Passion-flowers. American species of Passifloraceae are described by Ellsworth P. Killip of the United States National Museum in a recent publication of the Field Museum of Natural History in Chicago. The 331 pages include a section on varying concepts of classification.

Gardens. Fine gardens of Philadelphia, Wilmington, Cleveland, elsewhere in Ohio, and on Long Island are pictured in the spring quarterly number of *Landscape Architecture.* Descriptive text accompanies most of the views.

Notes, News, and Comment

England. T. H. Everett, Horticulturist, left May 13 for a six weeks' trip to England, during which he planned to attend the Chelsea Flower Show in London and the annual dinner of Kew gardeners. He is visiting the Royal Botanic Gardens at Kew and Edinburgh, the Royal Horticultural Society's gardens at Wisley, and many private gardens, particularly those of the shareholders in The New York Botanical Garden's expeditions. He is especially interested in checking personally the condition of plants acquired from the Garden's Rocky Mountain expedition of 1936. While abroad he is lecturing on this expedition before the Northern and Southern Associations of Park Superintendents at Stockport and London. He also expects to do some work in checking *Begonia* species and to bring back a quantity of new plant material.

Rock Garden Course. A working course in rock garden construction is planned at the Botanical Garden to start about the middle of this month, the date yet to be arranged. Twelve evening sessions will be taught by A. C. Pfander for a total fee of ten dollars. Each person in the class will build a scale model of a garden, arranging rocks, mixing soil, and planting living material, to cover an area of approximately 50 square feet.

To New Orleans. Frank J. Mackaness, exchange student gardener from the Royal Botanic Gardens at Kew, England, who is just completing his year of work with The New York Botanical Garden, will go to New Orleans in September, after a summer in England, to organize and direct a new horticultural course at Dillard University. The course, which is designed for the training of colored people as gardeners in the south, will consist of four years of study which will lead to a degree in horticulture.

Crowds. Following a week-end of unusual crowds at the Botanical Garden, a periodic count was made of the people visiting different parts of the grounds on Memorial Day. Although the iris were no longer at their best, 2,000 persons viewed them on May 30. With roses just beginning to come into flower, there were 200 cars parked as close to the rose garden as they could get. Approximately 2,200 people visited the rock garden, as against at least 3,000 the previous day. Twenty-five hundred people circulated through the three succulent houses, which are the only sections of Conservatory Range No. 1 that are now open. The perennial border of the Advisory Council, east of Range 1, was visited by 8,000 people, who crowded the path in front of the border during most of the day.

Honors. Prof. Marston T. Bogert of Columbia University, a member of the Board of Managers of The New York Botanical Garden, has twice been honored recently in the field of chemistry. On May 23 announcement was made that he was to be awarded the Priestley medal "for distinguished service to chemistry." A few days later word came from Rome, where Professor Bogert was attending two worldwide chemical meetings, that he had been elected President of the International Union of Chemistry. The medal, to be presented in Milwaukee in September, was established in 1923 in honor of Joseph Priestley, discoverer of oxygen in 1774, and since then has been awarded triennially.

Sigma Xi. Dr. William J. Robbins was one of the speakers at Wellesley College May 13 at the installation of Sigma Xi, honorary scientific fraternity. He addressed both advanced and elementary botanists on "The Meaning of Research." Other speakers were Dr. Karl M. Wiegand of Cornell on "A Taxonomist's

Experience with Hybrids in the Wild" and Dr. Walter H. Snell of Brown University on research work in forest pathology.

Visitors. Two Swedish botanists from Uppsala were visitors at the Botanical Garden May 28. They were Dr. Göte Turesson, Director of the Institute of Plant Systematics and Genetics of the Agricultural College of Sweden, and Carl G. Alm, Assistant at the Botanical Garden of the University there.

Dedication. The Fairchild Tropical Garden in Dade County, Florida, to which Col. and Mrs. Robert H. Montgomery had given 83 acres of land in Coral Gables and 200 species of palms and flowering trees with sufficient funds for their planting, was dedicated March 23 with elaborate ceremonies. Col. Montgomery, Dr. L. H. Bailey, and Dr. E. D. Merrill were among the speakers. Dr. David Fairchild, whose friends had named the place in his honor, gave the principal address, speaking on "The Future of the Garden." During the last few years of his life, Dr. John K. Small had been deeply interested in the establishment of this garden, and he contributed and planted many of its specimens. Throughout the dedication ceremonies, tribute was paid to the work of Col. Montgomery.

Hepaticae. Continuing a series of hepaticae which she has been donating to the Botanical Garden at various periods, Miss Caroline C. Haynes, a member of the Garden, last month presented 100 specimens of European hepaticae (Series XXI and XXII of V. Schiffner's European exsiccatae) and also 133 Schiffner herbarium specimens dated 1893-1894. These collections comprise a valuable addition to the Garden's herbarium, to which Miss Haynes has already contributed much useful material and knowledge through her special studies of the liverworts. This last gift she presented during a visit to the Garden with her sister, Miss Louise Haynes, May 12.

Meeting. Fifty members of the American Rock Garden Society held their annual meeting at the Botanical Garden May 16, visiting the Thompson Memorial Rock Garden, then going by bus to Tarrytown to see the garden of Mr. and Mrs. Walter D. Blair. Mrs. Clement G. Houghton was re-elected president of the society.

Mycologist. Dr. Lewis E. Wehmeyer, Associate Professor of Botany, University of Michigan, spent a few days at the Garden looking over certain groups of ascomycetous fungi, preparatory to a monograph of the genus *Eutypella.*

Reviewers. Arthur Herrington, who reviews "The English Garden" in this issue, knows not only England (for he was born and educated there) but also gardening and its history. He is a major executive of the International Flower Show in New York. P. J. van Melle is a Poughkeepsie nurseryman who has spent many hours in the Botanical Garden's library working on the genus *Dianthus.* Lucy Orenstein is a teacher of biology at the Evander Childs high school in the Bronx. Margaret McKenny is the author of "Mushrooms of Field and Wood."

Myxomycete Collection

The New York Botanical Garden has lately acquired by purchase the collection of nearly 3,000 specimens of myxomycetes made by Dr. William C. Sturgis, the result of a lifetime's collection and study, and accompanied by his literature, notes, drawings, and correspondence with other students covering a period of 40 years.

Another important collection recently obtained is the personal collection of Robert Hagelstein, Honorary Curator of Myxomycetes. Mr. Hagelstein has presented more than 4,800 specimens, the majority of which were personally collected by him and his associates along the Atlantic Coast from Maine to Virginia and in the West Indies. Among them also are about 1,500 specimens from other parts of the world received in exchange.

Both collections are rich in type material, rare species and varieties, and unusual phases. The entire collection of the Garden, which includes also the specimens collected by the late J. B. Ellis, now comprises more than 10,000 specimens and is probably the largest and finest in North America, and one of the important collections of the world. It is catalogued and arranged so that any particular specimen may be found. There is a large amount of duplicate material—even in rare species—which is available for exchange with other institutions and students. Correspondence regarding these specimens is invited.

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The New York Botanical Garden was incorporated by a special act of the Legislature of the State of New York in 1891. The Act of Incorporation provides, among other things, for a self-perpetuating body of incorporators, who meet annually to elect members of the Board of Managers. They also elect new members of their own body, the present roster of which is given below.

The Advisory Council consists of 12 or more women who are elected by the Board. By custom, they are also elected to the Corporation. Their names are marked with an asterisk in the list below. Officers are: Mrs. Elon Huntington Hooker, Chairman; Mrs. Carl A. de Gersdorff, Vice-chairman; Mrs. Nelson B. Williams, Recording Secretary; Mrs. Townsend Scudder, Corresponding Secretary; and Mrs. F. Leonard Kellogg, Treasurer.

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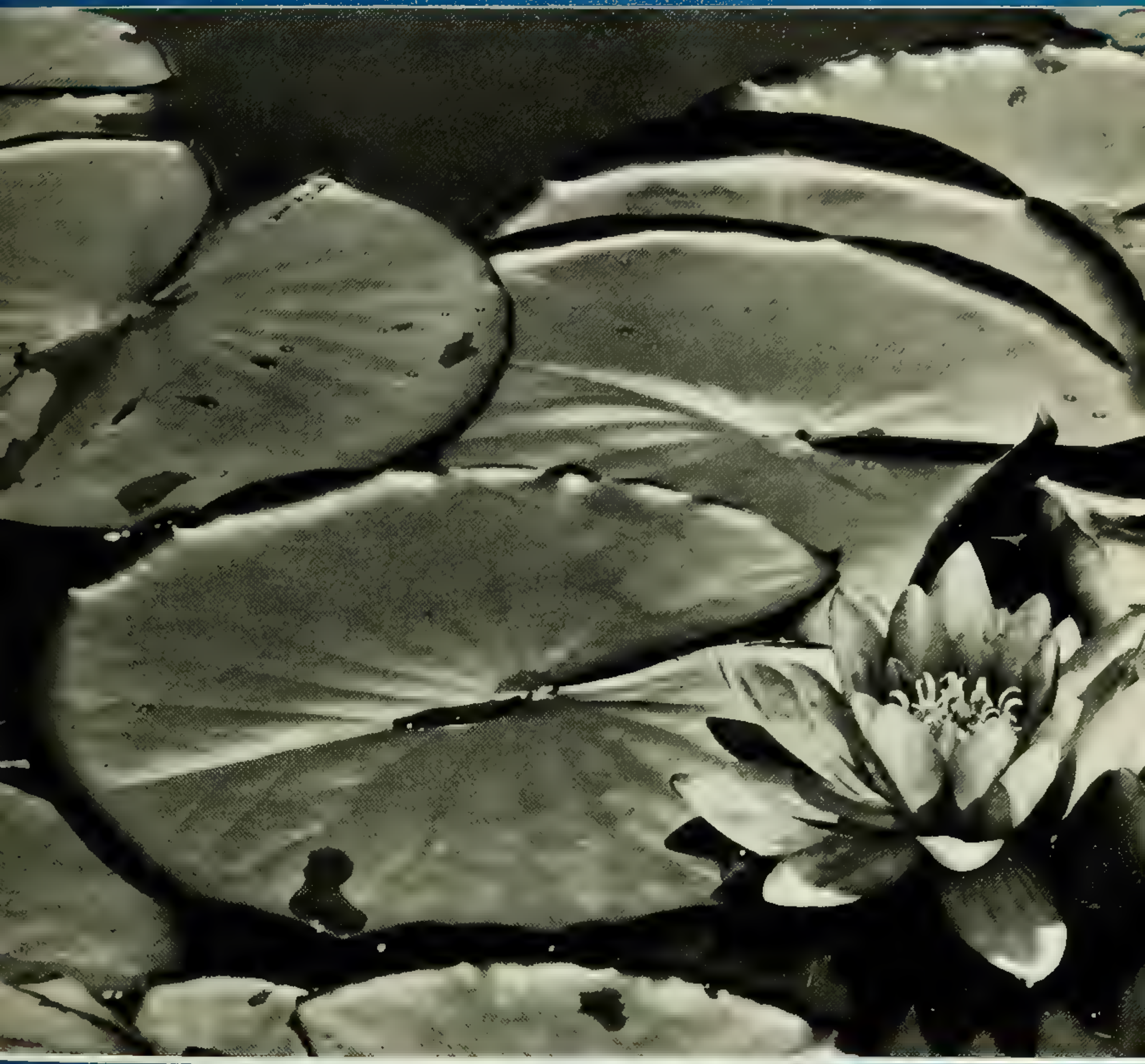

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CAROL H. WOODWARD, Editor

JULY, 1938

IN THE WATERLILY POOL — Cover Photographed by Fleda Griffith

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THE LIBRARY'S SERVICES

High school and university students, instructors, professors, research workers, specialists in a number of lines besides the growing of plants or teaching of botany, writers requiring specific information, nature students, garden club members, and other gardeners, both amateur and professional —these are the types of people who are making regular use of the library of The New York Botanical Garden.

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There is scarcely a profession or a horticultural or botanical interest which can not be served in the library of The New York Botanical Garden.

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Results of Recent Research In the Control of Pests on Trees

By E. Porter Felt

Bartlett Tree Research Laboratories, Stamford, Conn.

THE satisfactory control of insect pests depends to a large degree upon an accurate knowledge of the life history and habits of the species under consideration. An important phase, in the case of a number of insects, is the means of distribution or dissemination. It was shown a number of years ago, for example, that although the female gypsy moth, *Porthetria dispar,* was unable to fly, there was an extensive dissemination by wind carriage of the recently hatched caterpillars, and until this was ascertained there were a number of puzzling situations of vital importance to those attempting to eradicate or control the pest.

A somewhat analogous situation exists in relation to the European elm bark beetle, *Scolytus multistriatus,* now believed to be a most important agent in the dissemination of the Dutch elm disease. There is no doubt as to the factors in relation to the spread of the infection in the immediate vicinity of diseased trees, but there has been a question as to whether the beetles could carry the infection a considerable distance. It has been held by some that the beetles' flight was limited and apparently little consideration had been given to the possibilities of wind drift, in spite of the fact that swarms of related species have been known to be carried considerable distances by wind currents.

In an effort to throw light upon this problem the Bartlett Tree Research Laboratories started a balloon release project in 1936, continuing it in 1937. During that period nearly ten thousand tag-bearing toy balloons inflated with hydrogen to a minimum buoyancy were released at various points within fifty miles of New York City. There were nearly five hundred returns, and a number of drift records of thirty to forty-five miles an hour. They showed a decidedly easterly drift, both northerly and southerly, and relatively little drift directly north or westerly. The northeasterly drift gave fairly abundant returns in an area from Stamford, Conn., the point at which most balloons were released, nearly to Hartford, with a very considerable number landing along the south shore of Connecticut both in 1936 and 1937. This concentration along the south shore agrees very closely with the extension of the Dutch elm disease infected area, the number of diseased trees decreasing with the distance from the presumable center of infection, namely, an area in northern New Jersey. The northeasterly drift in 1937 resulted in one return from Popham Beach, Maine, a drift of 260 miles, several returns from the Cape Cod area, and twelve from well distributed points in Rhode Island. Returns in 1936 showed a distinct southeasterly drift with so many recoveries on the south shore of Long Island as to indicate a considerable drift out to sea. This latter is significant, since it shows that millions of beetles from the earlier badly infected area in New Jersey and southeastern New York must have been lost at sea. This probability is further suggested by the hosts of Japanese beetles in midsummer drift on both New Jersey and Long Island beaches. These latter insects, which are fairly large and metallic green in color, would be readily seen, while the elm bark beetle, which is brown or black, only a tenth of an inch long, would presumably escape notice in the tidal drift. It is believed the prevalence of easterly and southeasterly drift during much of the time when European elm bark beetles are in flight accounts to a considerable extent for the somewhat close limitation of the Dutch elm disease to the southern portion of New York and the coast line of Connecticut. The probabilities are that the spread of the disease will be considerably slower than heretofore because of the systematic destruction of diseased and weakly trees throughout the infected area, thus greatly reducing opportunities for these beetles to multiply.

Spruce Trees in Danger

The appearance of the European spruce sawfly, *Diprion polytomum,* in widely separated sections of New England in 1935, is another illustration of the influence of wind drift upon the distribution of insects, since it is quite probable that this species drifted in considerable numbers from the Gaspé Peninsula over New England and northern New York. The extensive defoliations of spruce in Maine, New Hampshire, and Vermont localities in 1937 suggests that this insect may become a serious enemy of the widely planted Norway spruce. The larvae or false caterpillars are light green with five more or less complete white stripes. They are about seven-eighths of an inch long when fully grown and harmonize so closely with the foliage upon which they occur that it is unusually difficult to see the pests. They feed by preference on the old foliage, consequently badly injured trees present a tufted appearance because of the fringe of usually unharmed new needles on the tips of the branches. There are two generations in Maine, the larvae of the first occurring in late May and those of the second in August. There is presumably a third and possibly a fourth generation in southern New England and in southern New York State. This pest probably requires several years to develop a serious infestation locally, much depending upon climatic conditions. Spraying ornamental spruce with arsenate of lead while the larvae are small should give satisfactory control.

Saving the Holly

The holly leaf miner, *Phytomyza ilicis,* seriously disfigures foliage of this beautiful evergreen, and prior to last summer no satisfactory method of control was known. Experiments with nicotine oil combination failed to give a satisfactory kill of the miners within the leaves. Spraying the newly developed foliage with arsenate of lead at the time the flies were abundant resulted in a rather quick kill and entirely satisfactory control. The date for Stamford was May 25, 1937. Arsenate of lead was used at the rate of 5 pounds to 100 gallons of water with a suitable spreader or sticker, such as S.S.S., at the rate of 1 pound to 100 gallons of spray. Equally satisfactory results were secured by outdoor applications to badly infested plants.

Difficulties with Dogwood

Studies on the dogwood club gall were continued the past season and an unusual situation developed. Two gall midges were reared in almost equal numbers from a large number of galls and neither was identical with the species previously supposed to produce this deformation. Observations in 1936 showed that the yellowish maggots deserted the galls in September or early in October, and in 1936 sixty percent of the galls were empty October 15. The molasses nicotine combination similar to that used for the control of the box leaf miner appeared of some value in shaded localities, though not on dogwoods exposed to full sunlight. This gall producer becomes extremely abundant locally and seemingly displays a marked preference for the pink dogwood. Cutting and burning the galls before mid-September should give reasonably satisfactory control in small or somewhat isolated plantings.

Azalea and Pine Borers

The azalea stem borer, *Oberea myops,* hollows the tips of azalea branches and girdles rhododendron stems. The nearly grown grubs are yellowish, less than an inch long and distinctly swollen in the region just behind the head. Two years are required to complete the life cycle. The second summer the grubs work their way down to the roots and the beetles fly at about the time the plants are in bloom. Cutting and burning branches showing wilted or dead leaves is the most satisfactory control. The pitted ambrosia beetle, *Corthylus punctatissimus,* produces similar conditions in rhododendron stems, except that the entire stem is affected and the closely placed series of small blackened galleries causes it to break readily at the surface of the ground.

The Scotch pine borer, *Hylobius radicis,* the grubs of which work at the base of Scotch pine in particular, is becoming more abundant. Infestation is indicated by a weakened yellowish foliage and stunted growth and at the base of the tree by masses of pitch-impregnated soil overlying the injured areas. It is possible that a considerable degree of protection can be secured by painting a band several inches wide of thick lime sulphur wash at the base of the tree and in addition spreading around the trunk of the tree a small amount of Go West, since this product is attractive to a number of the weevils and is very effective in killing the related black vine weevil, *Brachyrhinus sulcatus,* so injurious to the roots of Taxus.

Scale Insects

Scale insects continue to attract notice. A new mealy bug, the recently described *Pseudococcus cuspidatae,* was found somewhat abundant on yew, *Taxus cuspidata,* at Greenwich, Conn. The area of occurrence and the degree of infestation has so far been limited. This mealy bug does not produce the masses of cottony matter hanging in festoons and loaded with eggs so characteristic of Comstock's mealy bug, *Pseudococcus comstocki,* which also occurs on Taxus. A species of *Pulvinaria,* believed to be new, has also been found upon Taxus and is reported as likely to become quite serious. Another new scale insect, an undescribed species of *Cerococcus,* was found extremely abundant in a laurel planting at Haverford, Pennsylvania. This brown, somewhat star-shaped scale insect is related to the much more common Lecaniums. A somewhat abundant infestation of locust trees by a species of *Lecaniodiaspis* was also found at Haverford, Penn.

The European beech scale, *Cryptococcus fagi,* has been abundant and injurious on beech at Hartford, Conn., for some years and is known to occur in relatively sparse numbers in several localities in southern Westchester County, New York. This insect produces conditions on beech favorable to invasion by a nectria and the combination is considered responsible for extensive killing of beech during recent years in Nova Scotia and parts of Maine. Fortunately, this deadly alliance has not, to our knowledge, become established farther south. Forcible spraying in midsummer with nicotine at the usual strength with two percent of a white or summer oil to serve as a spreader appears to give reasonably satisfactory control of the scale insect.

The abundant occurrence of the English walnut scale, *Aspidiotus juglans-regiae,* on Austrian pines in the Philadelphia area means that a new food plant has been adopted by this species, which occurs on a considerable variety of deciduous trees, such as walnut, linden, locust, maple, and box-elder, as well as on most fruit trees.

An unusual infestation of the well known oyster-shell scale, *Lepidosaphes ulmi,* occurred on beech in a woodland at Stockbridge, Mass. The scale insect was so abundant as to kill many of the small branches. The infestation was easily recognized in midsummer by the somewhat general occurrence of twigs with dead leaves attached.

On Rhododendrons

A European white fly, *Dialeurodes chittendenii*, is becoming abundant and destructive on rhododendron in the greater New York area. It was first found in a Long Island nursery in 1934 and is considered to be a possibly destructive insect, since an infestation builds up rapidly. A two percent summer oil spray is said to give satisfactory control.

Tested Sprays

Experiments at the Laboratories the past two seasons with several colloidal arsenates of lead in which the arsenical was in a very fine suspension failed to indicate a markedly greater toxicity for these compounds as compared with the more usual arsenates of lead now on the market. One of these colloidal forms has been recommended at such great dilutions as 1 pound to 500 or 700 gallons of water. This treatment was found ineffective in controlling abundant infestations of cankerworms, although satisfactory results were obtained when the dosage was increased to approximately that recommended for the standard arsenates of lead.

Extensive tests with derris powder or cubé powder in rosin residue emulsions were conducted by a group of tree men, members of the National Shade Tree Conference, in co-operation with Dr. C. C. Hamilton of the New Jersey Agricultural Experiment Station. The summary given by Dr. Hamilton shows that in the case of cankerworms there were two adverse and eleven satisfactory reports. While the reports on scale insects and red spiders were contradictory, good results were obtained against the tent caterpillars, fall webworms, catalpa sphinx caterpillars, spiny elm caterpillars, pear slugs, European spruce sawfly larvae, and currant worms, and fairly good results were obtained in the control of the larch case bearer, Japanese beetle, the Asiatic garden beetle and June bugs. Generally speaking, the results were reasonably good in the case of more susceptible species and not so favorable with pests possessing a higher resistance.

A Plea For the Amateur

By Sarah V. Coombs

SOME professional horticulturists think with moderately concealed scorn of the amateur and his or her—generally her—contribution to the science of gardening, especially as shown in flower shows. By amateur, I mean the one who grows plants with no help or only a moderate amount.

It is true that the amateur's contribution to "straight" horticulture has not, as a rule, been outstanding. The daffodils, roses, gladioli, are often a sorry lot. Dahlias, for some reason, possibly that the man of the family is often responsible, may be good. Men specialize in growing flowers more than women do. Plain flower types such as zinnias and marigolds, when seen at a flower show, are probably fine. Yet on the whole, the standard is not very high so that the professional who often is good enough to act as judge does not expect much and awards prizes rather lavishly. He gives much time and judges with the utmost conscientiousness, going over each exhibit carefully, even when the whole class should rightfully be dismissed with a wave of the hand.

How are we going to raise the standard of growing and exhibiting in this country, never forgetting that amateurs are sometimes incipient scientists and may go far? The forward-looking professionals are hopeful, but the amateurs must feel the urge themselves, must jack themselves up or we shall not get very far. Yet they can be helped.

Though good horticulture is professedly the aim of gardening, it is often lost in the maze of other interests. To say that for many amateurs it rests on the shaky foundation of the "Miniature Arrangements" in flower shows is pretty far-fetched, yet there is more than a grain of truth in this statement, for it is by means of such apparently unimportant and foolish lures that the person we want to influence is first attracted. The owner of a small garden is persuaded to put a miniature arrangement in a flower show. It looks easy. It isn't, for it is even more difficult to make a good design, with good color, in a tiny picture where everything is reduced to its simplest terms than in a large arrangement. It goes in, however, and perhaps because the exhibitor is something of an artist or because of the weirdness of much

"artistic" amateur judging, it gets a prize. Many clubs now have a class for novices in which they are pitted against those only who are as ignorant as they. In any case, the exhibitor is encouraged to try some of the other classes in the next show. This goes on for a year or two when—it would seem suddenly—the exhibitor's attention is held by the flowers themselves. Perhaps she has taken a course in Judging for Amateur Shows in which a large share is given to straight horticulture. In any case, she compares her flowers with those grown by others and the start is made.

Just here is where others can help. Perhaps the exhibitor's eyes have been opened to the beauty and variety of daffodils in one of the big shows. The names of the classes mean nothing. What is a *Barrii* or an *incomparabilis* or a *cyclamineus* hybrid? Why, instead of the big trumpet daffodils which the florist sells under the name of jonquils, is the jonquil class filled with sweet-scented little clustered flowers?

Most garden clubs now have horticultural chairmen whose duty it is to tell the members just such things, but botanic gardens, horticultural magazines and, above all, the scientists themselves can help the ignorant but eager amateur.

When daffodils are in season, every person who can be induced, beaten, bribed or kidnapped should be taken to see one or more of the great glorious blooming spots and the different types should be pointed out. Once shown such a place, a springtime hereafter when those people miss that sight will be considered by them a springtime wasted. It is a rewarding task, for the amateurs are on the whole a rather meek and grateful lot. Will they not grow better daffodils hereafter? They should be helped by classified lists of varieties suitable for the full and for the rather flat purse. If they grow one fine daffodil as a result, even that is something.

How many amateurs see the flowering crabapples and cherries in our botanic gardens? Or the irises or the roses, the gladioli or the dahlias, the berried shrubs or the rhododendrons? The botanists are over-busy with their research and their classification, the horticulturists are hard at work planting all these lovely things, but the amateur needs their help.

We are supposed to be a literate race, yet most of us hark back to our remote ancestors in learning more quickly and easily by

seeing. Perhaps we have read about the beauty-bush or the Louisiana irises or the dove-tree. We may have seen colored illustrations which are vivid and interesting but when we have once seen a glorious waterfall of the pink flowers of the Kolkwitzia or the strange tawny color of some of the irises, or especially, if we have seen the dove-tree's fluttering white "bird", we shall never forget them. The more flowers the amateur can see, the more likely he is to develop into a real horticulturist.

In the mediaeval dimness of the early years of the century, when many facts had to be dug out painfully by the amateur, Bailey's "Cyclopedia of American Horticulture" was, to the writer of this, then an eager but entirely ignorant gardener, the lamp which lighted many midnight hours of study. Dr. Bailey's books are standards still and there are many others nowadays, yet we still must learn by seeing, by doing and by our mistakes. Having done it once, not again will this writer plant twenty-five different perennials in a bed 25 feet by 5, her only salvation having been that many of them never came up! Our amateur must learn, in one way if not in another, and guiding hands will save many a false step and many a time-wasting mistake.

A Word to the Amateur

This has been a plea to the scientist to help the amateur. Now a few words to the amateur herself. There are men's garden clubs now and more power to them. May they live long and prosper! Yet the rank amateur is more likely so far to belong to the "female sect." If you want to get anywhere, you must work. You must plant good stuff. That is rather easy. The catalogs are tempting and dramatic, and visions of splendid new marigolds and lupins and delphiniums and roses and shrubs fill the mind with delightful pictures. Having acquired and planted these treasures in suitable soil, it is awfully easy to forget them. Enthusiasm wanes as the thermometer climbs. It is so easy not to go out with the hose or the sprayer—I know just how easy—but remember that when somebody else's dahlias and late roses and new annuals are better than yours at the show, you are going to wish you *had* done what was needed. When the judges turn thumbs down on your exhibit because there are holes in the foliage or the flowers are not as big as they should be for that variety, it will be just too bad.

Since the path to horticulture is strewn with flower shows, a hint or two about preparing for them may not be out of place. Cut your flowers the night before and set in deep water in a cool place over night. Wrap a paper about your dahlias, your poppies, your heliotrope and your mignonette and burn the ends of the stems over a flame till a porous carbon is formed which will let the water enter. Cut your roses in bud, your poppies also. Plants with a milky juice will be helped by salt or ashes in the water which keeps the sap from hardening. A pail half-filled with damp sand and with chicken-wire over the top may be a good carrier for your flowers. Lay your dahlias in a long box if you don't want them to decapitate themselves. Wrap the open flowers of your gladioli in paper to hold them back till the buds open. If in a spring show, cut your tulips from 24 to 48 hours ahead of time and set in deep water, giving them time to decide whether to have a back bone or a "Hogarth line of beauty"! If they curve annoyingly but gracefully, use them in an arrangement. Cut red- or orange-cupped narcissi just before they open, as the sun fades the color, but let the sun bleach the white ones. When you get to the show, arrange your flowers if you have a chance. A collection may be made or spoiled by arrangement.

Above all, have good flowers. Have something those fine professional horticulturists will really like to judge; and thus shall we who are amateurs win favor in their eyes, and whether our days are long in the land or not, we shall have had a grand time.

A Mother of Islands

By H. H. Rusby

THE mangrove, which may be found at the edge of salt water in tropical regions, has been well characterized as a "mother of islands." It also slowly extends the area of the land toward the ocean wherever it takes root. The principal mangrove of the coast and the islands off southeastern United States is *Rhizophora Mangle* L. Other species of essentially the same, though slightly different habit, occupy similar regions in other parts of the world.

Torn loose by the waves during a storm, a small native mangrove shrub is carried away by the tide until it becomes stranded at some place where the water is shallow. Here it takes root and

develops into a large erect shrub or small tree. Eventually it bears flowers and fruits.

After flowering, the mature pod does not fall, neither does it discharge its seed, but it remains closed and sometimes attached as long as a year, its stem continuing to grow indefinitely. The seed contained in the pod then germinates *in situ*, its root becoming extruded and turning downward, gradually increasing in thickness and strength as it elongates. When the root is about 12 or 15 inches long, the seedling becomes detached from the parent plant, and either becomes lodged in the mud directly below, or is carried away by wind or tide to some other point, where, if the water is shallow, the young root gets a foothold and draws up nourishment for the young growing plant.

As the mangrove matures, it sends down adventitious roots from the under side of the branches, either vertically or at an angle. As these reach the water, and later the mud below, the branches, strengthened by this new support, and by others which develop later, extend themselves indefinitely, spreading outward in all directions. By continuation of this process, these adventitious roots often branching, the original plant develops into a miniature forest with hundreds and finally thousands of stem-like roots standing thickly in the shallow water, and so firmly anchored that they safely resist the action of wind and wave.

Many of the leaves which fall become entangled in the roots and decay, thus making continual additions to the soil at the bottom. This same network of stems and roots catches and holds other floating vegetation which comes its way. When storms occur, stirring up the sand and earth beneath the water, more or less of this earthy material is caught in the network of vegetation, and it in turn becomes a resting place for further additions of the same kind. As the years go by, this mangrove growth, at first insignificant, may come to cover acres or even square miles, and a soil which at first barely showed above the surface at a single point becomes an island or an extension of the shore, where ultimately human habitations may be established.

This is no fancy sketch of a process that is merely possible, but an accurate description of one that is now in operation in hundreds of places. It is not too much to say that much of the land now constituting the southwestern portion of the peninsula of Florida and the adjacent islands originated in this way.

The Recognition of Some Common Native Trees By Their Leaves

By Harold N. Moldenke

WITH descriptions of the leaves of eight of the fifteen common native trees which have been treated in previous numbers of the Journal the year-around series of articles on identification of trees is continued in this issue. Leaves of the seven remaining trees will be described by Dr. Moldenke in a forthcoming number of the Journal. The series will be continued with an illustrated presentation of the flowers and fruits of these same trees by Dr. W. H. Camp. The photographs of the leaves in this and the next number, which have been made by Miss Fleda Griffith, have all been taken at the same distance from the subject, and are reproduced here at approximately one-fifth natural size.*—C.H.W.

Sweet-gum (*Liquidambar Styraciflua*). The characteristic leaves of the sweet-gum render it one of the easiest of our native trees to identify, for no other tree in our flora possesses star-shaped leaves. Only with some of the maples could it remotely be confused, but the sweet-gum's leaves are less irregular in outline, are equipped with long petioles, and arranged on the twigs in alternate fashion instead of opposite in pairs. They are fragrant when bruised and turn to a deep crimson color in the autumn. The blades, which are three to nine inches in diameter, are mostly broader than long, and they vary from almost truncate to slightly heart-shaped at the base. Smooth and shining above, the leaves are often pubescent beneath in the axils of the larger veins. The three to seven deeply cut, sharply pointed lobes are surprisingly uniform and regular. Their margins are evenly serrate with fine, sharp, gland-tipped teeth. The main venation is palmate—that is, the principal veins issue from a single point at the base of the leaf from where they spread outward somewhat in the manner of the fingers of one's hand.

American Linden (*Tilia americana*). Of the dozen or more lindens found in the eastern United States, this one is perhaps the most common in our immediate region, where it is frequently called either basswood or whitewood. The leaves, which are comparatively large, occur in alternate fashion on the twigs. Unlike

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* Trees in Profile by Forman T. McLean, Dec. 1937; Bark and Buds to Identify Some Native Trees in Winter by E. J. Alexander, March and April 1938.

those of the sweet-gum, however, they are not arranged spirally, but are borne on directly opposite sides of the twigs in a distichous

The sweet-gum (above) is the only native tree with definitely star-shaped leaves. The base of each leaf of the American linden (below) is inequilateral.

or two-ranked fashion. A twig of sweet-gum will not lie flat on the table, because the leaves issue from all sides of it, but a twig of the linden will lie perfectly flat, with every leaf in its natural position. The leaves are simple and comparatively short-petiolate, thick-textured when mature, smooth and dark dull green above, paler beneath and also smooth except for tufts of rusty-brown hairs in the axils of the prominent veins. Broadly ovate in outline, the leaves are usually about five to six inches long and two to five inches wide. The apex is very abruptly acuminate or prolonged into a short, sharp point. The base is mostly heart-shaped or more rarely truncate and is conspicuously oblique or inequilateral. The margins are rather coarsely serrate with incurved glandular teeth. The venation is pinnate—that is, like the branches of a feather, except at the very base on the longer side.

Silver Maple (*Acer saccharinum*). The maples belong in that comparatively small group of native trees whose leaves are arranged in pairs opposite each other on the twigs. The pairs, as can be plainly seen in the upper illustration, lie at right angles to each other, so that a perfect mosaic is formed when the branch is viewed from above. Normally each blade is thus exposed fully to the sunlight so necessary to the growth of the tree. The slender, often drooping, red petioles are four to five inches in length. If the point of a compass were placed in the center of the mid-vein of a silver maple leaf, a circle drawn would touch the tip and base of the leaf and would pass just inside the tips of the two main lateral lobes. Thus, though the lobes are slender, the blade itself is nearly orbicular in outline, usually about four to six inches long and six to seven inches wide. Even at maturity the leaf-blade is thin-textured, being smooth and pale green above and silvery-glaucous and more or less pubescent below, especially when young. Though the leaves are definitely palmately five-veined, often only three of the lobes are distinct, the lower pair being much smaller than the others. At the base the leaves are truncate or slightly heart-shaped. The lobes are rather narrow, coarsely and irregularly dentate or incised, sharply acuminate at the apex, and separated from each other by very acute sinuses. The terminal lobe usually has a small divergent secondary lobe on each side at about the middle.

Sugar Maple (*Acer saccharum*). Of the dozen or more maples of the eastern states, the sugar maple and silver maple (described above) are perhaps the commonest in this area, although the red

and Carolina maples are also locally abundant. The individual lobes of the leaf of the sugar maple, shown in the upper left-

The twig at the right shows the typical arrangement of maple leaves, as exemplified by the silver maple. Above, at the left, is a single leaf of the native sugar maple. Similar in form but different in texture are the leaves of the buttonwood, shown below at both the left and right.

hand corner of the illustration, are much broader than those of the silver maple. The blades, which are palmately three- to five-veined and three- to five-lobed, are usually about three to six inches in both breadth and length. They are rather thin at maturity, smooth on both surfaces, dark green and dull above, paler beneath, and heart-shaped or truncate at the base. The broad lobes are sparingly and irregularly sinuate-toothed, and both lobes and teeth are sharply acuminate at the apex—that is, they are drawn out into an elongated point. The sinuses between the lobes are broadly rounded, causing the leaf-surface to appear more or less wavy and the lobes to overlap when a leaf is laid flat for photographing.

Buttonwood (*Platanus occidentalis*). The leaves of the buttonwood, also known as the buttonball, plane-tree, or sycamore, resemble somewhat those of the maples, but may be distinguished at once by their thicker texture, the hairiness of the young leaves, and their spirally alternate arrangement on the twigs. Both a single leaf and a twig are shown in the illustration. The conically hollowed petiole-base is also characteristic, completely enclosing and hiding the new bud for the next year, instead of each bud being borne openly in the axil of the leaf, as is the case with the maples and most of our other trees. The petioles are stout and about three to five inches long, which means they are usually shorter than the blade. The firm-textured leaf-blades are four to nine inches wide (or much broader on vigorous shoots) and measure slightly less in length. Shallowly three- to five-lobed and palmately veined, they vary at the base from truncate or slightly heart-shaped to wedge-shaped, like the one at the right in the picture. When young, they are densely floccose-pubescent with whitish branched hairs, especially beneath, but they become nearly glabrous on maturity except for a slight pubescence on the principal veins beneath. One leaf on the left in the illustration and a small one on the right are shown in reverse. The leaves vary greatly in shape, even on a single tree, though the lobes are always broad, mostly large, and acuminate at the apex. The margins may be sinuate-dentate with rather remote acuminate teeth, as in the photograph, or entire and merely undulate.

Sassafras (*Sassafras variifolium*). Unmistakable is the sassafras tree in leaf. No other tree in our local flora has leaves which vary so conspicuously on the same branch from entire-margined

to mitten-shaped and even plainly three-lobed! Also, none of our other trees has leaves which are mucilaginous when chewed, and

The sassafras bears three types of leaves on a single branch—entire, mitten-shaped, and three-lobed.

these have the distinctive sassafras flavor. The leaves are spirally alternate in their arrangement on the twig, and their blades are ovate or obovate in outline, four to six inches long, two to four inches wide, and plainly cuneate (wedge-shaped) at the base. Smooth, bright green above, they are glaucescent and smooth or slightly pubescent beneath, becoming less pubescent in age. Their thin texture is revealed in the impression of the twig through several of the leaves in the illustration. The lobes, when present, are broadly ovate or elliptic in shape and acute at the apex, with sinuses which are broad and rounded. The petioles are very short and slender, usually only ¾ to 1½ inches in length. The venation is pinnate, the principal veins arising from different positions along the midrib, although the veins leading to the lobes are mostly stronger and more conspicuous than the rest.

Tulip-tree (*Liriodendron Tulipifera*). Another tree whose foliage is unmistakable is the tulip-tree or yellow poplar. The broad notch at the apex gives each leaf a squarish or saddle-shaped appearance, which prevents an observer from confusing it with the leaf of any other tree in the region. The blades vary from three to six inches in length and width and are borne on long petioles which are spirally alternate on the twigs. At the base they vary from slightly heart-shaped or wedge-shaped (as in the picture) to truncate or rounded. Ordinarily four-lobed, the blades sometimes have two small additional basal lobes. At maturity the leaves are rather thin in texture. They are smooth and lustrous above and of a paler dull green beneath. A few of them turn color as soon as the flowering season is over the last of June, so that by early autumn an entire tree is brilliant yellow.

Sour-gum (*Nyssa sylvatica*). This tree, which is also known as tupelo or pepperidge, is most common along streams and about the margin of ponds, although it may be found also on hillsides and in abandoned pastures, where its seeds have been dropped by passing birds. Its glossy leaves are uniformly smaller than any of those thus far discussed. Though they are spirally alternate, they are mostly crowded at the ends of short lateral branches, or more remotely scattered on vigorous shoots. In shape the blades vary from elliptic to obovate-elliptic or obovate. They are two to five inches long, rather thick in texture at maturity, dark green and very lustrous above, and glaucescent and smooth beneath or more or less pubescent along the veins. At the apex the leaves are rather abruptly acute, while they are cuneate at the base. The

petioles are one-quarter to one and one-half inches long and are usually fringed on the margins. The leaves turn bright scarlet on the upper surface in rather early autumn before they fall.

The tulip-tree (left) is known by the indentation at the tip of each leaf; the sour-gum (right) by its glossy, clustered, entire-margined leaves.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Good Reading for Gardeners

THE GARDENER'S DAY BOOK. Richardson Wright. 384 pages, indexed. J. B. Lippincott Co. 1938. $2.50.

"The question of what inveterate gardeners do when they are not gardening can be easily answered—they read about it. . You may know a good gardener by the fact that, although his feet are set firmly on earth, his interests range without limit through space and time. Within the bounds of his particular world and beyond them, he is constantly widening his vision, polishing his imagination and heightening his experience. That is the reason I, who vowed never to write another gardening book, am hereby throwing my good resolution out the window. Each year piles experience on experience and vision on vision. The garden becomes crowded not alone with plants but with gardeners also, some of them in the flesh—friendly, helpful and generous—others mere ghosts from out the dim past. Across these pages they will walk, ..." Thus speaks Richardson Wright in "The Gardener's Day Book."

Praises be that this ever popular flower show judge, toastmaster, lecturer, editor, philosopher, historian and humorist has stolen time again to jot down and present another collection of assorted juicy bits of garden gossip sprinkled generously with witty thumb-nail sketches gleaned from his own rich storeroom of readings, reminiscences and present-day cronies.

This Day Book follows the form and format of the famous Gardener's Bed Books—for each of the 365 days there is a selection of some 200 words terminating with a daily reminder such as "Oil the mole traps. You'll be needing them soon," or "Be stingy with water on Christmas Cactus and the buds won't fall off." At the end of each month Mr. Wright just can't keep within bounds so he throws in for good measure an extra 2,000-word sketch and calls it the Long Piece—"At the Tavern of the Old Taxonomist" is his choice for the close ot January.

It is as difficult to present a true picture of the rich contents of this book as it is to predict what Mr. Wright will think of next. However, if you enjoy a bit of frivolity mixed in with a goodly measure of gardening common sense you will not be disappointed when you read "The Gardener's Day Book."

ELIZABETH C. HALL.

On Flower Shows

FLOWER SHOWS AND HOW TO STAGE THEM. Adele S. Fisher. Illustrated with photographs. Richard R. Smith, New York. 1938. $5.

This book has much to recommend it. For one thing, it is, I believe, the first one to offer so complete a picture of flower show procedure, though there have been a number of pamphlets with suggestions. It is an agreeable book to look at, many of the pictures being reproductions of prize-winning flower arrangements, wall-gardens, shadow box groups, garden borders, etc. Mrs. Fisher has been for years an intelligent and earnest worker for flower shows and was instrumental in starting the first garden center, that of Hackensack. She has been interested in civic planting and roadside improvement. Her influence is far-reaching. Because of her good work, I find it difficult and ungracious to say that I think her book might have been better.

There are many good suggestions. One, especially, is the use of a card catalogue for flower-committee chairmen, each card containing a list of the duties of the office, with an implication as to what is not expected, so that departments will not overlap.

I find especially helpful the suggestion for a clean-up chairman and for a flower distribution chairman. Having helped with many flower shows, I know that cleaning up after several days of hard work, with the excitement all past, is one

of the dullest and most difficult jobs imaginable, and the idea of having a fresh, new individual in charge, one who is not limp and tired out, is most attractive. Then the suggestion that the flowers for the sick should be carefully arranged in separate boxes brings to memory large rather messy bunches of lovely flowers, gathered together hastily after the show and sent to hospitals. How much more the flowers would mean to sick people if they reached them carefully laid in suitable boxes, neatly wrapped and tied.

I do not agree with Mrs. Fisher that artists make the best flower show judges; that is, unless they have also a knowledge of flowers. Line, color, balance, proportion are all most important but there is, in work with flowers, something further, a technique impossible to be understood by one unacquainted with the growth of flowers. Many will not agree with me but my conclusion has been reached after many years of judging with many delightful artists.

Since I am supposed to be horticultural watchdog for a sizeable group of garden club members, I shall have to do a little barking. With all its good points, I find the book deficient in one important particular. It all comes back to the question, "What are flower shows for?" To interest garden club members? To attract the community? To start children working? To stage a beautiful plan? All these are worthy objects, yet our real object, in show and in garden club, should be to raise the standard of horticulture, to induce people to grow better flowers than they ever did before. Suggestions for simple, inexpensive, practical ways of making fences, backgrounds and seats for flower shows are interesting —but are they horticulture? I find little emphasis laid on the flowers themselves, few classes for specimens in the schedules, except in the dahlia one and in some of the school children's work. People can learn much from flower show gardens and there are gardens galore, but not enough importance has been given to the flowers.

Now, having barked rather fiercely, may I finish by saying that Mrs. Fisher's book will help many people in their flower show plans and that, if those people will give "straight" horticulture at least a fifty-fifty chance, all will be well.

SARAH V. COOMBS.

Ferns and Their Lore

OUR FERNS, THEIR HAUNTS, HABITS AND FOLKLORE. Willard Nelson Clute. 388 pages, illustrated, indexed. Frederick A. Stokes Co. 1938. $4.

This is a very welcome revision of the excellent book, "Our Ferns in Their Haunts," which has been out of print for some time.

Eighty-four species and their various forms found east of the Rockies and north of the Gulf States are included. In this edition there are additional species described, the illustrations and descriptions have been much extended, and the nomenclature has been brought up to date. There are several short, concise keys: two descriptive types, one for the genera and one for species in each genera, and one with illustrations of sporangia.

We thankfully note that the well established common names have not been changed and that synonyms for the scientific are given. The author has, however, given a number of the less common forms new popular names.

He is conservative in his divisions of species, as in *Pellaea atropurpurea*, where he does not recognize *glabella* as a species, but rather as a form.

The many quotations of poetry and the references to the folklore and distribution in other countries add much spice to the fine descriptions. "Our Ferns" will make a valuable addition to the reference library of the fern student or hobbyist.

FARIDA A. WILEY.

The Proper Care of Trees

PRACTICAL TREE SURGERY. Millard F. Blair. 297 pages, illustrated, indexed. Christopher Publishing House, Boston. 1938. $4.

"Practical Tree Surgery" by Millard F. Blair is an attractively printed, well illustrated volume, whose nearly 300 pages deal with a wide variety of topics relating to trees and tree care, about one-half of it being devoted to brief discussions of many insects and plant diseases. The matter relating to tree surgery, using the word in its restricted and proper sense, occupies less than 100 pages and deals with such subjects as tree structure, trimming, planting and pruning, bracing, cavity work, feeding, moving, grafting and budding, propagation by cuttings and layering, pollination of flowers, flower parts, and a somewhat unusual chapter on ropes and knots.

The large number of subjects treated compels brevity, in some cases at the expense of clarity. The book appears to have been written with the needs of the expert in mind and is obviously western in its discussions of insects and diseases in particular. It is therefore of greatest service to tree men on the Pacific slope.

E. P. FELT.

Magnificent Gardens

GARDENS AND GARDENING. Edited by F. A. Mercer. 132 pages, illustrated with photographs and plans. The Studio, New York and London. 1938. $4.50.

While a British flavor and continental air are bound to enter a gardening annual which is published in England, the seventh issue of Gardens and Gardening contains enough American photographs and sufficient practical material for any land, to be of decided interest and usefulness to American gardeners. Abundantly and beautifully illustrated, the volume includes, among its main topics, Planning and Replanning the Garden (with a dozen scale drawings); Plans by Leading Garden Architects; Colour in the Garden; Pools, Ponds and Streams and How to Use Them; and Rocks, Their Meaning and Use in Japanese Gardens. Of no less interest are the notes and illustrations of such garden and landscape features as substitutes for rhododendrons, intimate gardens, boundaries, and numerous other topics, with special emphasis placed on the garden of small or medium size. The book gives one the feeling that every garden is magnificent and every shrub and flower is superb.

CAROL H. WOODWARD.

Picture Books

GARDEN BULBS IN COLOR. J. Horace McFarland, R. Marion Hatton, and Daniel J. Foley. 296 pages, illustrated in color, indexed. Macmillan, New York, 1938. $3.50.

ANNUALS FOR YOUR GARDEN. Daniel J. Foley. 96 pages, illustrated in color, indexed. Macmillan, New York, 1938. $1.

When a fair collection of catalogs, most of which are free for the asking, will provide an abundance of colored pictures of garden flowers, one wonders why these same pictures are collected into books. But they are—here is one on bulbs and one on annuals—and people seemed to like the earlier one on garden flowers enough to induce a publisher to put out more. Their chief advantage is to enable the beginning gardener to select (with high hopes) the flowers which are so brilliantly pictured, or to make quick identifications of plants which spring up without benefit of labels. Information and simple cultural directions are given for each plant illustrated. The book of annuals emphasizes the All-America selections. The bulb book contains pictures of several indoor subjects as well as of hardy garden material. In view of the recent warnings against such tulips as the Rembrandts, which are likely to spread their virus disease through the garden, it seems a bit out of place in speaking of the "broken" tulips for the authors to remark: "Gardeners are missing much pleasure by not growing more of them."

However, the books on the whole are well handled, and no doubt serve a good purpose in acquainting their purchasers pictorially with many colorful garden flowers.

CAROL H. WOODWARD.

Current Literature At a Glance*

By Carol H. Woodward

Ferns. The May-June issue of *Torreya* will be of special interest to anyone visiting the Pine Barrens of New Jersey this summer, for Martha H. Hollinshead has described the ferns to be found in that region.

City Trees. How a program for the planting of street trees in New York City is now being carried out is explained by E. L. D. Seymour in the *City Gardens Club Bulletin*. By arrangement with Anthony V. Grande in the Park Department offices in the Central Park Arsenal, a single tree may be planted at the request of an individual in metropolitan New York for a cost of about fifty dollars. In other sections and for trees in quantity, the cost of each specimen becomes less.

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* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Florida Trees. Ornamental trees of Florida are described by Harold Mowry in Bulletin 95 of the Agricultural Experiment Station at Gainesville, Fla.

Trough Gardening. A new type of receptacle for growing alpine plants is described by Dr. R. C. C. Clay in *Gardening Illustrated* (London) May 28. Old stone troughs, some of them dating back 200 years, are used. Dr. Clay exhibited a number of them at the Chelsea Flower Show in London this year.

Phlox. Dwarf species and varieties of phlox are described in the May 14 number of *Lexington Leaflets.* A score of named color forms of *Phlox subulata* are listed.

Storage. Brief, up-to-date directions for the commercial storage of fruits, vegetables, and florists' stocks are given in the revised edition of U.S.D.A. Circular 278, which is obtainable from the Superintendent of Documents, Washington, D.C., for 10 cents.

Walls. A series of articles on plants to use in wall gardens, written by C. W. Wood, is running in *The American Nurseryman* this summer.

Nuttall. The travels and the scientific collections of Thomas Nuttall are the subject of an extensive article in *Bartonia,* the Proceedings of the Philadelphia Botanical Club, No. 18. Material which had been prepared by Willard W. Eggleston prior to his death late in 1935 was incorporated in the final work by Francis W. Pennell.

Franklinia. "A Supplementary Chapter on *Franklinia alatamaha*" has been written by Francis Harper and Arthur N. Leeds for *Bartonia* (No. 19). It records some recent expeditions in search of Bartram's famed "Gordonia"—but still the shrub's disappearance from the wild remains a mystery.

Australia. A new handbook, paper-covered and illustrated in color, lists 86 common Australian wild flowers.

Soybeans. A new green vegetable for the American table is forthcoming through the careful selection and use of soybeans. A study of soybeans for the American diet has been made by Sybil Woodruff and Helen Klaas, published as Bulletin 443 of the University of Illinois Agricultural Experiment Station. The mature beans give promise as a low-cost source of protein in the diet, while the green beans may be picked and cooked immediately or preserved by freezing for later use. Flour is also made from soybeans.

"Broken" Tulips. Specific answers are given to some of the questions frequently asked regarding the "breaking" of tulips. in an article by Frank P. McWhorter and Philip Brierley in the *Florists' Exchange* for June 11. Two opposing viruses are involved, they explain, in the color distortions in tulips which give rise to "broken" flowers. Broken tulips may infect healthy stock in a field. The virus may be carried from the bulbs of *Lilium candidum* or *L. tigrinum,* and the most common cause for the spread of the disease in large plantings is the presence of the potato and peach aphids. The disease does not show until the year after the infection. Parrot tulips do not belong to the "broken" class, but Rembrandts do. This means that a grower who wishes to maintain healthy stock should destroy all tulips of the Rembrandt and similar types, as they are diseased.

Gardening. Three of the outstanding practical articles in *Real Gardening* for June are "Sprays and Dusts for Garden Troubles" by L. C. Chadwick, "What Makes a Good Rock Garden" by Marcel Le Piniec, and "The Needs of a Native Plant Garden" by the editor, Robert S. Lemmon. Among other topics of the month are lilacs, lilies, sedums, irises, eriogonums, and vegetables. Arthur Herrington writes especially for garden club members on "Just How to Organize a Flower Show."

Notes, News, and Comment

From England. Professor Sir Albert C. Seward, botanist, formerly Master of Downing College and Vice-Chancellor of Cambridge University, was a visitor at The New York Botanical Garden on May 25 and was a guest of staff members at lunch. Professor Seward is well known for his work on fossil plants and particularly in this country for his book, "Plant Life Through the Ages."

Scholarship Students. Working at The New York Botanical Garden this summer on scholarships are Dr. Margaret Fulford from the University of Cincinnati, who is spending two months on the liverwort genus *Bazzania*; Edna Kobs of Blackburn College in Virginia, doing a month's research on sugar; Joseph Allerton of New York University and Betty Waterbury of New Jersey College for Women, both working under Dr. A. B. Stout for a month; and Josephine McAllister, a Columbia graduate student, who is continuing her studies on diseases of Opuntia with a month of special work under Dr. B. O. Dodge. During the spring, Oswaldo Lourenso spent a month with Dr. Dodge on a scholarship making illustrations and cultures of the pink bread-mold, *Neurospora*.

Laboratory. Mrs. Mary Bartley Schmidt came to the Garden July 1 from the University of Missouri to do four months of special laboratory work on the nutrition of roots under the direction of Dr. William J. Robbins.

Summer Studies. Dr. Ernest Nailor, Assistant Professor of Botany at the University of Missouri, is at the Botanical Garden this summer doing some research on vegetative propagation. John Middleton, a graduate student at Missouri, spent two weeks here in June doing some special work in mycology.

Prize-winners. A group of daylily seedlings exhibited by The New York Botanical Garden at the headquarters of the Horticultural Society of New York June 20 and 21 received a gold medal. Other prize displays included five stalks of *Lilium candidum,* another group of lilies, and a group of campanulas shown by Mrs. Helen M. Fox; a standard hydrangea exhibited by Mrs. Christian R. Holmes; and a bowl of cut clematis hybrids from the gardens of J. E. Spingarn.

Returned. Dr. A. C. Smith returned to New York and the Garden early in June after a nine-months' trip exploring in South America, during which he gathered specimens from unknown territory far in the interior of British Guiana.

Visitors. Dr. H. H. Whetzel of Cornell University spent two days at the Botanical Garden in June identifying some fungus hosts from Santo Domingo. Dr. Frank Egler of Syracuse University worked for a day in the oriental herbarium.

New Books. Among the books which have recently been acquired by the Library are several from the Stanford University Press. "Alaska Wild Flowers" by Ada White Sharples fills a need among northern travelers with many good photographs illustrating its 156 pages of descriptions. "Northern Rocky Mountain Trees and Shrubs" by J. E. Kirkwood, with its complete descriptions, in systematic order, and its photographs of plants and drawings of floral and leaf parts, has been a standard work ever since its publication in 1930. John L. Ridgway's "Scientific Illustration" is an indispensable work for one who needs to know the methods, technique, styles, and codes to be used in illustrating scientific works. "The Trees of Yosemite" by Mary Curry Tresidder is illustrated with 34 block linoleum prints by Della Taylor Hoss. Chapters on ten explorers of the nineteenth century are contained in "Naturalists of the Frontier" by Samuel Wood Geiser, published by the Southern Methodist University Press. Biographical notes on many others are provided in an appendix.

Genetics. Professor Edmund W. Sinnott of Barnard College, a member of the Botanical Garden's Board of Managers, is to be transferred to Columbia University's new laboratory of genetics for research on growth and inheritance. Beginning July 1, Dr. Sinnott is dividing his time between the college and the new laboratory, where, after two years, he expects to devote all his time to the botanical phases of the work.

Traveler. Dr. Carl Skottsberg, Director of the Botanical Garden at Göteborg, Sweden, stopped at The New York Botanical Garden June 9 on his way to Hawaii, where he will do three months of research, returning home to Sweden via New Zealand.

Alaskan Flora. Dr. Eric Hultén of Lund University, Sweden, spent two weeks in June at the Botanical Garden here working on the flora of Alaska in the herbarium.

Grapes. Dr. A. B. Stout went to Geneva, N. Y., June 15 to continue his work in the breeding of hardy seedless grapes.

THE NEW YORK BOTANICAL GARDEN

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ARTHUR J. CORBETT ..... *Superintendent of Buildings and Grounds*
A. C. PFANDER ..... *Assistant Superintendent*

MEMBERSHIP IN THE GARDEN

Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

The classes of membership and types of benefaction are as follows:

Annual Member	annual fee	$ 10
Sustaining Member	annual fee	25
Garden Club Affiliation	annual fee for club	25
Fellowship Member	annual fee	100
Member for Life	single contribution	250
Fellow for Life	single contribution	1,000
Patron	single contribution	5,000
Benefactor	single contribution	25,000

Contributions to the Garden may be deducted from taxable incomes. The following is a legally approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

August, 1938

MIDSUMMER IN THE DECIDUOUS ARBORETUM
Cover Photograph by Fleda Griffith

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SCHOLARSHIPS

Every summer a number of botanists from other institutions come to The New York Botanical Garden for a month or more to pursue special problems in research. Some of them are taxonomists, working on the classification of flowering plants, ferns, mosses, liverworts, algae, and fungi—a task which is essential to a thorough understanding of botany. Some are interested in the distribution of plants, others in plant diseases and their control. Still others choose plant breeding or the structure and functioning of the cells and organs of plants for their particular studies.

To some of these investigators it is possible to grant limited scholarships which are provided from the income of the Garden. Those who are thus assisted are college graduates, usually scientists with a doctor's degree or its equivalent, for it is the desire to award scholarships primarily to individuals who have proved their capability in carrying on independent research. The purpose of the scholarship is a dual one: to aid the approved research worker and to make a contribution to the progress of botanical science.

Alexander P. Anderson, who many years ago discovered the breakfast possibilities in "exploded" grains of rice and wheat while he was doing research at the Botanical Garden, established the Alexander P. and Lydia Anderson Research and Fellowship Fund, the income from which is used each year in the interest of scientific research. With this, one or more students of botany are aided in work on important botanical projects.

It is a matter of regret that larger sums for these purposes are not at present in the hands of the Botanical Garden, because this institution is in many respects unequaled in its facilities for research and in the opportunities it presents for the training of young scientists. Each year the worthy applicants far outnumber those who can be accepted on the small allotment available for scholarships.

Additional funds for scholarships and fellowships would mean much greater progress in botanical research, since The New York Botanical Garden, with its herbarium, library, laboratories, and highly trained scientific staff, offers exceptional means for the advancement of the science which deals with the fundamental living things of the earth.

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The People's Responsibility In Warring Against the Dutch Elm Disease

By Don Bloch

While progress has been definitely made during the past five years toward the eradication of the so-called Dutch elm disease, dangers still lie ahead unless persistent efforts are made to destroy every weakened elm which might become a carrier. This means not only a strong government force at steady work, but also the whole-hearted co-operation of every citizen who has so much as a single elm tree on or near his property. In the following pages, Don Bloch, representing the American Forestry Association, tells the story of the Dutch elm disease and describes the campaign for its elimination.—C.H.W.

TODAY, in this country, a billion elms grow in wooded valleys, on hillsides, and along the highways of the nation. Twenty-five million of these are counted as of special shade and ornamental value, nourished for their esthetic or sentimental qualities.

Would you have them all go?

The question is a pertinent one. There is danger—imminent danger, that they will go, and that in no great space of years.

In 1930, in Ohio, autopsies on four elm trees confirmed their cause of death as the dreaded Dutch elm disease, resulting from infection by *Graphium* (or *Ceratostomella*) *Ulmi*. How this fungal malady, spread from tree to tree on the backs and in the bodies of tiny, European bark-boring beetles, got to the middle west, no one then could tell. It was not until almost three years later, when the scourge was discovered full blast in New Jersey, whence it spread rapidly into the nearby states of New York and Connecticut, that a real epidemic was recognized. Immediately, our scientists began systematic attempts to discover its method of entry

into this country and to control its further spread. A group of the Department of Agriculture's ace pathological "detectives" were put upon the case. European investigators had already established the fact that two European elm bark beetles, *Scolytus Scolytus* and *Scolytus multistriatus*, were carrying the disease from elm tree to elm tree over there, it was pointed out in an early report by R. Kent Beattie of the Federal Bureau of Plant Industry.

"The first Graphium-infected elms cut down in New Jersey revealed," Mr. Beattie continued in his report, "that live beetles and larvae were abundant in tunnels between the wood and the bark. These were determined as *Scolytus multistriatus*. But even though the beetle was carrying the fungus *Graphium Ulmi* from elm tree to elm tree in New Jersey, how did the beetle and the fungus get from Europe to America? . .

"On Monday, August 7, 1933, L. M. Scott, Plant Inspector of the Bureau of Entomology and Plant Quarantine in charge of the port of Baltimore, examined in his port ten elm burl logs which had just arrived from France. He had read the night before an account of the Dutch elm disease. The burls, he found, were destined for a veneer manufacturing plant in Kentucky. In these logs he found some bark beetles which were determined shortly by Dr. M. W. Blackman, of the Bureau of Entomology, as *Scolytus Scolytus*, the vector in Europe, and a species not known here.

"Representatives of the Division of Forest Pathology were notified at once. They examined the logs and found an abundance of fungous growth in and around the insect tunnels between the bark and the wood and, in the young wood, characteristic brown streaks such as are produced by *Graphium Ulmi*. From specimens then taken, a considerable number of colonies of *Graphium Ulmi* were soon isolated by Curtis May and M. E. Fowler, thus confirming that these elm burls were carriers across the Atlantic of the dread Dutch elm disease."

About this time *Scolytus multistriatus* was determined as the principal carrier of the disease. After feeding upon small twigs, where the leaves are attached, and sometimes on the buds, the female beetles fly to the trunks and larger branches of dead or weakened elms, or even to recently cut elm logs, where they tunnel under the bark to lay their eggs. These egg tunnels, characteristically parallel to the grain of the wood and bark, may be an inch to four inches long. From the hundred or more eggs laid close together along both sides of a tunnel, tiny larvae or grubs

This double-comb pattern, which is found on the wood just beneath the bark of elms, indicates the presence of the elm bark beetle, principal carrier of the Dutch elm disease in the United States. The line which runs parallel to the grain is the tunnel in which eggs are laid. The wavy "teeth" of the comb are formed by the burrowing of the newly hatched grubs to the points at which they emerge by digging holes through the bark. If a tree is diseased, they carry the spores with them to other trees upon which they feed when mature.

hatch and burrow across the grain to form a characteristically wavy "double-comb" pattern.

Shedding its skin from time to time as it grows and eats its way to the end of its larval tunnel, each is transformed into a reddish black, adult beetle. Then as a beetle, it digs out through the bark leaving a tiny shot-hole-like opening in the bark about one-sixteenth of an inch long. Thousands of such beetles may

emerge from a single tree. Should their tree host be affected with the Dutch elm disease, the beetles may carry its spores on their bodies and in their digestive tracts.

Then flying—actually swarming in bright weather—to nearby elms, the emerging beetles carry the spores of the fungus to new trees and innoculate them as did their parents and grandparents, by feeding upon twigs at the bases of leaves and on tender buds.

All six species of elm native to this country have been countless times innoculated with the fungus under laboratory conditions in this country and in Europe, with definite conclusion that no elm which grows naturally anywhere in the United States is safe.

The fact that the bark beetle of European origin, *Scolytus multistriatus,* has been established as the chief carrier of Dutch elm disease, gives little or no sense of security, for we have a native bark boring beetle, *Hylurgopinus rufipes,* with similar habits. The American beetle is found in practically all places where the elm is native. Should these beetles begin feeding on diseased elms, they may carry the fungus to healthy trees as effectively as does the introduced insect. The Dutch elm disease is not yet reported in eastern Massachusetts and southern New Hampshire, for example; but both the native and the European insects are distributed there. So far, beetle and fungus have been miraculously kept apart in these latter areas; but when the fatal affinity may take place, no one knows.

State, federal, and local authorities agree that we need wholehearted co-operation and continued help in the future campaign to wipe the Dutch elm disease out of America. The program envisioned five years ago has been, with few interruptions, worked out in every essential detail. The picture today bears out the opinions held by officials in the beginning: that men and money were the basic needs; that with these both available at the right time and place, the disease could be eradicated.

Increasing from 820 cases in the three most heavily infested original states in 1933, there has been a steady increase in the number of Dutch elm diseased trees to date. The total number of infected trees, since 1930, when the disease was first identified in Ohio, stands at 29,856, as of July 1, 1938.

All these trees, of course, pursuant to eradication tactics now universally adopted, have been felled and burned over their stumps, and the stumps treated chemically to prevent any spread from latent disease. But in addition to these trees, there have been

eliminated vast numbers of elms—dead, dying, or of non-commercial value in infected areas. Altogether, 4,532,043 elms have been destroyed by a variety of sanitary measures. This has been found

Photograph by courtesy of G. J. Baetzhold.

The American elm, shown here, and every other species of Ulmus which is native to the United States is threatened by the Dutch elm disease unless government and citizens unite in persistent efforts to keep the causal fungus under control.

necessary to stop the spread of the disease: since every devitalized or low-value elm is a potential breeding place for the beetle, *Scolytus multistriatus;* since, recently, it has been discovered that the parasite may lie dormant for several years in an elm without giving any outward signs of its presence; and since the pathologists find, also, that the fungus can live and grow in dead elms. The new campaign emphasis, therefore, has been upon the removal of elms of low value in areas where the disease occurs.

The sum of $12,902,026 has been expended by Federal and State Governments in connection with this work over the country. Even this vast amount, however, is seen as fully justified in the light of the Department of Agriculture's recent census figures estimating the value of shade and ornamental elms in the United States. On the basis of an average value of $26.50 for each ornamental tree, says the census, $662,500,000 would be a nominal estimate of what their owners have invested in the country's elms.

Co-operating officials of the tri-state infected area have worked out an estimate of federal funds necessary to prosecute the campaign for another five years, through 1942. Based on past costs in the work area, the estimate totals about $15,000,000 to be spent in proportions of 40 per cent the first year, 25 per cent the second, then rapidly dwindling to 15, 12 and 8 per cent, respectively, for each year beginning with the present.

The projected eradication program embodies these major features: For the outlying infections, prompt employment of measures to eliminate the disease by felling infected trees and burning them; for the New Jersey, New York, and Connecticut areas—(1) timely and methodical scouting for diseased and devitalized elms and their later removal and destruction, (2) the rendering harmless of trees classified as devitalized by poisoning or "silviciding" them, and (3) continued creation of elm-free areas, regardless of the condition of the elms therein, so that the total work area can be progressively contracted from without and reduced from within.

Trained men who climb and examine each elm to discover its state of health scout the area of known infection as well as suspected areas. These latter are chiefly in a region of about 3,000 square miles surrounding the major work area of 7,471 square miles. It is called the "protective zone". Trees showing wilted foliage and discoloration of the wood are tagged and quarantined. However, since a number of other fungi cause similar symptoms

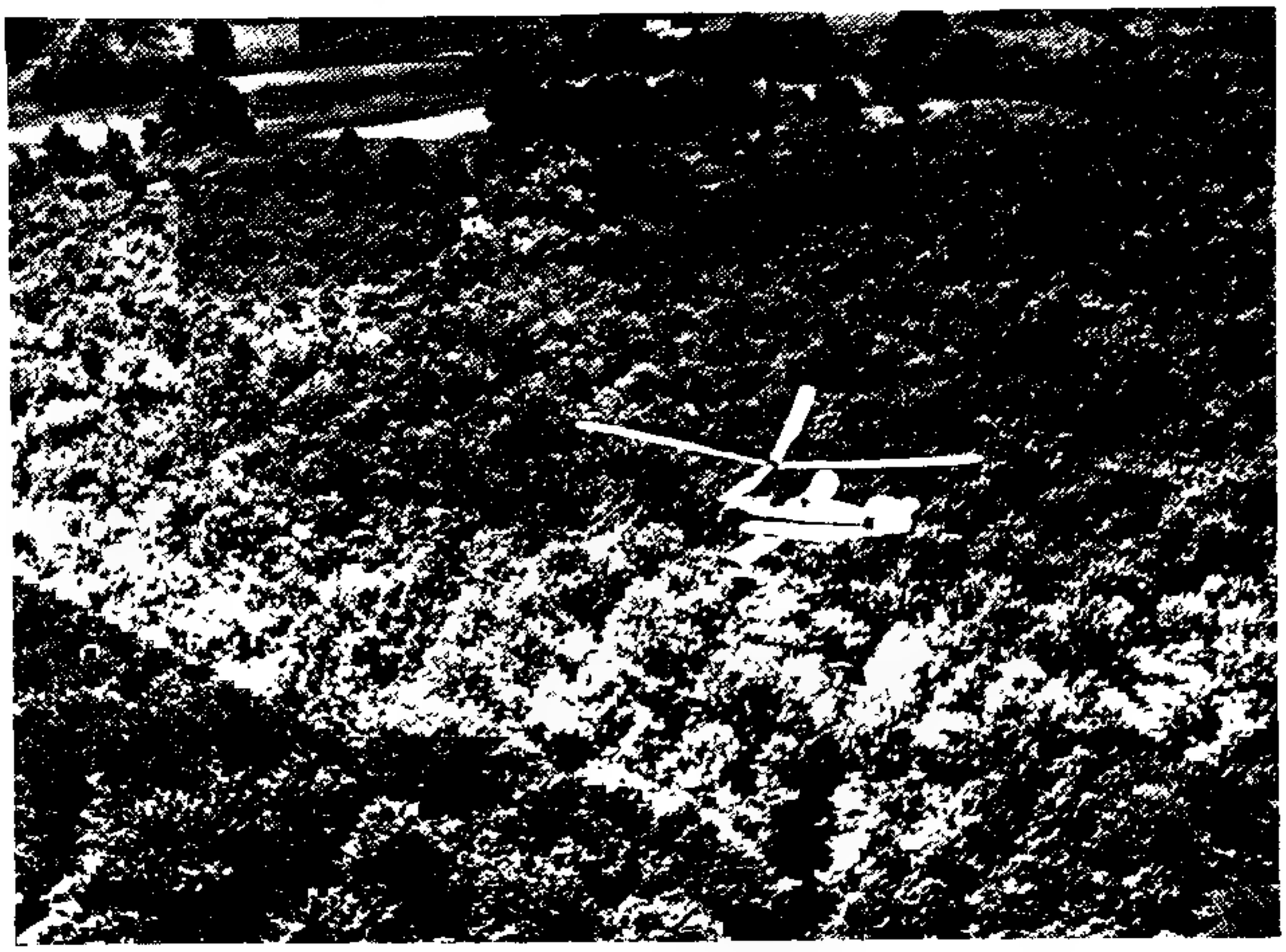
in elms, laboratory culture and diagnosis comprise the only reliable course to follow in determining presence or absence of the disease. Samples of the test trees thus quarantined are sent to the Federal Dutch Elm Disease Laboratory at Morristown, New Jersey, for culture analysis. If the sample there yields the Dutch elm disease fungus, the tree is legally condemned. It is then cut down, the wood and brush burned over the stump, and the latter treated with copper sulphate to prevent its sprouting.

Those elms having a sentimental or esthetic value are usually located where either scouting and tagging or later felling is easy. Those of no ornamental or commercial value, however, are generally found in swamp areas or on mountain ranges where scouting and cutting are hazardous and costly. So heavy has this latter phase of the work become that in some areas a process of silvicide is resorted to, whereby with certain chemicals the tree's danger as a beetle haven is practically nullified.

During the past year, 626,137 elms—almost all of them in New Jersey—have been killed by this method, which consists of peeling a band of bark from the tree at about breast height and placing over the exposed wood granulated copper sulphate, kept in place by a strip of oil-cloth. Moisture from the wood dissolves the chemical (which is sometimes in liquid form, when a wide rubber band is affixed to the trunk to hold it). This, taken up by the sap, soon poisons the tree and acts as a repellent to the beetles. The trees are left standing, and the owner may fell them at his convenience to use the wood for fuel or other purposes.

That eradication costs may be reduced by increasing the speed of the work both in scouting to find infected trees and cutting them out, two new forms of equipment have been introduced. One is a power-saw outfit so mounted that it can be taken to relatively rough or inaccessible places. With it, ten men can cut down and make ready to burn a tree twenty-one inches in diameter at breast height, in just twenty-one minutes. Another is the use of autogyro planes for scouting.

One observer traveling in an autogyro scouted 12,000 miles along railroad rights-of-way over which the original imported elm burl logs bringing the infection from abroad had been hauled inland to the veneer factories. A follow-up ground crew visited points marked on a map checked by the aerial observer. Other gyros carrying observers hovered close above the tree tops, over inaccessible regions in and around the centers of infection.



U. S. D. A.—Photograph by Rothstein.

Autogyros are used for scouting heavily forested areas and other out-of-the-way places in search of trees which show the characteristic wilting or yellowing of the Dutch elm disease.

All scouting becomes increasingly difficult as the campaign progresses. The men on this work must watch more closely for evidences of the disease and cover more inaccessible locations. This past year scouts were under orders to sample all elms showing any indications of abnormality. This necessitated more tree climbing than formerly, but greatly reduced the chance of overlooking infections. Twig samples from over 80,000 suspicious elms were gathered and forwarded to the culture laboratory from a total of 16,456 square miles scouted in 1937.

The campaign in New York State, concentrated largely in the heaviest infected areas of Westchester and Rockland counties, is under the direction of Dr. William H. Rankin at White Plains. Maps cover the walls of his offices, records bulge his files like those of an army officer. It is, in fact, like a campaign of war—a pathological war to the death against an enemy of microscopic fungi borne on the backs and in the bodies of tiny, bark-boring beetles. And New York, alone, has contributed $631,000 since 1935, to carry on the war.

In 1936, New York reported 1,740 diseased trees; in 1937, only 1,274—a total of 7,776 since 1933. These have been destroyed. The crews which cut and destroyed them worked also on all dead

and dying elms—the potential breeding spots of the future. More than three-quarters of a million such elms were destroyed in Westchester and Rockland counties last year.

State authorities in New York have so conducted their campaign that community and even private citizen "scouting", to report suspicious elms or possible new insect carriers, is a regular part of the general fight against the disease. Eradication has been thoroughly "sold" to the people of that state. Of course, once infected with the Dutch elm disease, there is no hope for saving the tree. However, without complete agreement among pathologists, all concede that spread of the disease is at least not so rapid where healthy elm trees predominate. Dead and dying elms are attractive to the beetles carrying the fungus which causes the Dutch elm disease. It is here they feed, lay eggs, and deposit spores or become smeared with them to carry the fungus to other trees.

Around the edge of the present area of heaviest infection, and around the protective zone fringing it, countless elm trees are in poor condition. By no law of nature is the disease bound to remain where it now is apparently confined. A combination of circumstances, climatological or pathological, may easily present itself any year to cause the disease to burst across its present vague barriers, spread rapidly through New York into contiguous areas to the west, leaving a waste of stricken elms in its wake.

Thus it threatens every elm in the country unless checked within its present region of heaviest infestation. Therein, in a manner, lies the responsibility, particularly of Westchester and Rockland counties. Of the almost 100,000 elms which scouts examined during the late foliar months of last year, no less than 75 per cent were locally or generally wilted, stagheaded, had yellowed or dropped-off leaves—a beetle paradise, and a region eminently suited to serve as a natural "pathological" bridge to healthy elms adjacent in all directions from the original foci of infections.

Accordingly, the best protection which the property owner can give his elms is to prevent infection among them. One simple rule of sanitation is to destroy at once all dead elms and prune out all dead or dying wood where the disease-carrying insects may seek food or egg-laying places. For specific advice the State Forester or a competent tree specialist should be consulted. Moreover, as a good neighbor and helpful citizen, he should urge continuance of funds to wage the fight being conducted by the Federal and State Governments to wipe out the Dutch elm disease.

Henry W. de Forest

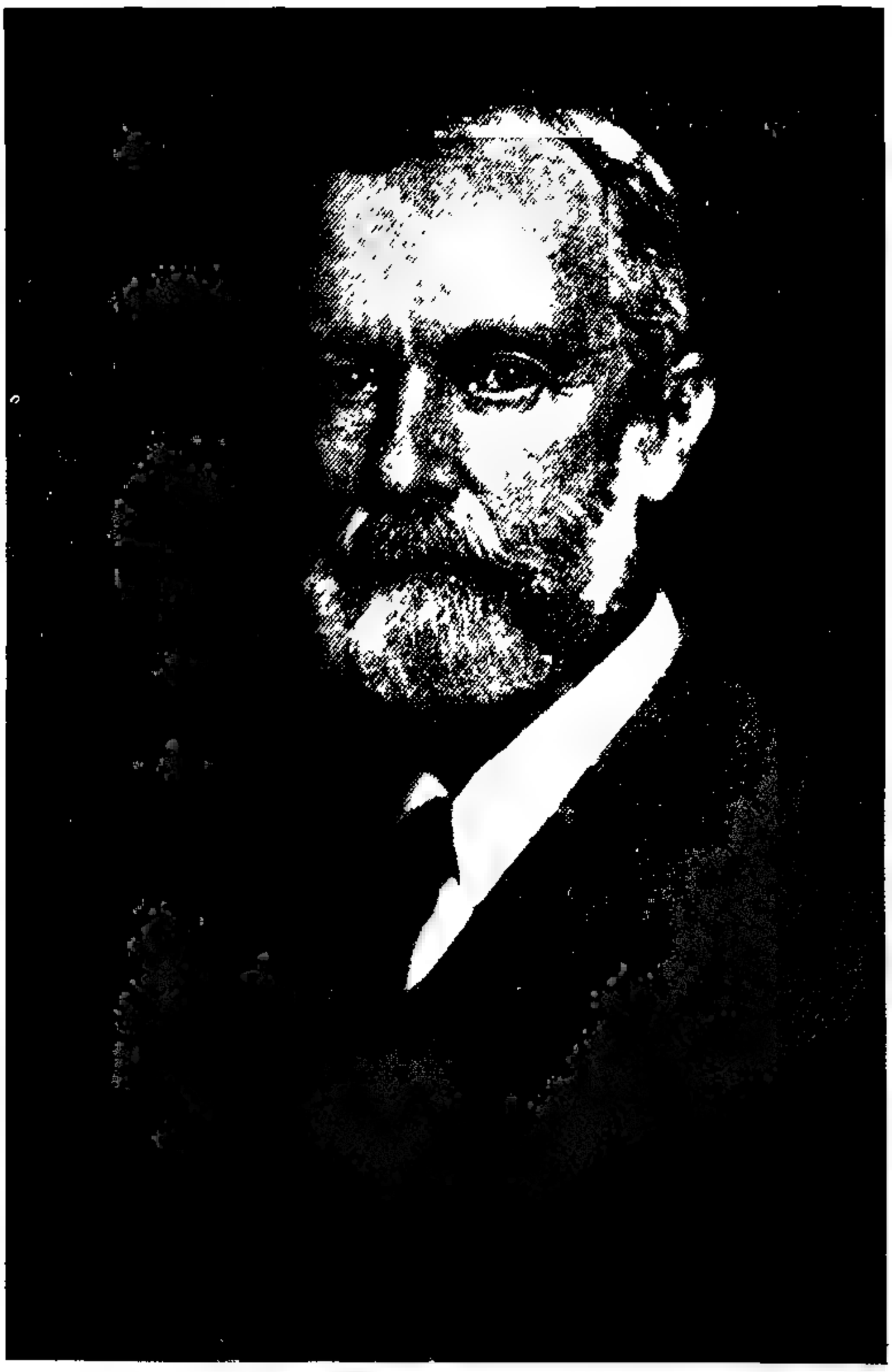
FOR ten years, until he resigned last November, Henry W. de Forest was President of The New York Botanical Garden. When he died on May 28 at the age of 82, the Garden as well as the numerous corporations which he had headed lost a leader who had been endowed with a rare ability to perceive and plan for the future, whether that future demanded immediate attention or a long slow period for development.

In both types of situation his genius as an executive was in evidence in his leadership of the Botanical Garden. A man with an intimate knowledge of plants and an intuitive recognition of their cultural needs, garden uses and horticultural values, and with an appreciation as well of scientific work, he sensed a situation and evaluated a new proposal at once and was always ready, with constructive criticism, to support the administration in any progressive change through which he could see a greater future for the Garden. It was during his presidency that the Thompson Memorial Rock Garden was conceived and developed and also that the Botanical Garden's herbarium collections were increased until, with 1,800,000 specimens, they ranked as one of the great collections of the world.

Mr. de Forest's own estate at Cold Spring Harbor, Long Island, was proof of his capability in garden design and culture. His innate sense of the relationship of plants to their environment resulted there, as in those parts of the Botanical Garden in which he took special interest, in harmonious, satisfying, landscape effects.

It was recognized that when Mr. de Forest addressed a board of directors, whether in the railroad, banking, oil, or insurance business, his audience unfailingly listened. When he spoke before a committee of one of his philanthropies, his word was accepted as the voice of authority. When he talked informally with professional gardeners, they too gave their attention, for here was a man from whom they knew they could learn.

A lawyer by profession, Mr. de Forest was also a railroad executive (he had held, among other posts, the chairmanship of the board of the Southern Pacific), and had directed at various times the affairs of such diverse corporations as the Pacific Oil Company, Bank of Commerce, and several insurance companies.



Photograph by courtesy of New York Herald-Tribune

Henry W. de Forest

Deeply concerned with civic affairs, and the preservation of wild life, he had been a leader in several national movements to save the birds, mammals, fish, and plant life of America, while his interest in human welfare led him to take part in the establishment of a number of New York hospitals.

Of all his interests, one of his keenest was The New York Botanical Garden. To its welfare he devoted unstintingly his remarkable energies.

The Recognition of Some Common Native Trees By Their Leaves

By Harold N. Moldenke

(Continued from the July issue)

Black Oak (*Quercus velutina*). There are some fifty different kinds of oaks in the eastern states, constituting an extremely difficult group for the amateur. In the black oak, as in all of them, the leaves are spirally alternate. Their blades, which vary from ovate to oblong or obovate in outline, are usually five to ten inches long and three to six inches wide, but very often attain much larger dimensions on vigorous shoots. At maturity they are firm and rather thick in texture, and above are lustrous dark green. Beneath they are paler and more or less pubescent or else entirely smooth except for tufts of rusty-colored hairs in the axils of the principal veins. The rather stout petioles are two to six inches long. The seven to eleven (mostly seven) lobes bear teeth with slightly undulating margins toward the apex and are separated by angular though slightly rounded sinuses which on young trees are usually very shallow but on older specimens extend halfway to the midrib or beyond. The teeth and lobes are all conspicuously bristle-tipped or sharply acuminate. A typical twig from a young tree is shown in the upper left of the picture opposite.

Pin Oak (*Quercus palustris*). This tree, often known as swamp oak or swamp Spanish oak, is especially abundant in moist ground in our area. Its leaf-blades are usually much smaller than those of the black oak, the lobes more deeply cut and the sinuses much broader. In outline the blades of the pin oak are broadly oval or obovate, two and one-half to six inches long, and two to four inches wide. At maturity they are thin-textured but firm, dark green above, paler beneath, and lustrous and smooth on both surfaces except for tufts of hair in the axils of the veins beneath. They are mostly cuneate, or wedge-shaped, at the base and, like those of the black oak, are acute at the apex, with the teeth and lobes sharply acuminate and bristle-tipped. There are five to seven lobes on each leaf and the lobes are oblong, lanceolate, or triangu-

The oaks are a confusing group if only leaves are considered, but the three species above are all distinctive forms. In the upper left is the black oak; at the right, with deeply cut, sharp-tipped lobes is the pin oak; below, with blunt lobes pointing toward the apex of the leaf, is the white oak, one leaf turned to show the whitish under-surface.

lar-lanceolate, divergent, one- to four-toothed or entire, and separated by broad rounded sinuses which sometimes extend almost to the midrib itself. The petiole is slender and only one-half to two inches long. A typical branchlet is seen on the right-hand side of the photograph on page 181.

White Oak (*Quercus alba*). The white oak differs from both of the previously described species in having the lobes and teeth of its leaf-blades conspicuously blunt or rounded and not at all acuminate or bristle-tipped. The leaf-blades are obovate-oblong in outline, four to nine inches long, two to four and one-half inches wide, wedge-shaped at the base, and three- to nine-lobed. At maturity they are thin-textured, firm, and bright green, and may be either dull or lustrous above, paler or even whitish beneath, and without hairs on either surface. The blunt, oblong lobes are ascending (that is, they point toward the apex of the leaf), round-toothed or entire along the margins, and separated by wide rounded sinuses, which may be rather shallow (as in variety *latiloba*) or may extend nearly to the midrib. The upper lobes are usually irregular, often with small secondary lobes toward their apex. The petioles are stout and only one-half to one inch in length.

Shagbark Hickory (*Carya ovata*). The hickories and ashes differ from all the other trees mentioned in this series in having compound rather than simple leaves—that is, each leaf is composed of several leaflets, or more than a single blade. In both cases these leaflets are arranged in pinnate fashion, arising from different points along the sides of the rachis, which corresponds to the midvein of a simple leaf. This is in distinction to the compound leaves of trees like the horsechestnut, where all the leaflets issue from a single point in palmate fashion, like a fan. Of the twenty kinds of hickory in the eastern states, the shagbark is one of our commonest. Its leaves, like those of all hickories, are spirally alternate, eight to fourteen inches long (or larger on young plants and vigorous shoots), and borne on rather long petioles. The four or six (usually four) lateral leaflets are sessile or almost sessile—that is, without basal stalks of their own—and are arranged in pairs along a stout, smooth or hairy, slightly grooved rachis ("midvein") the lowest pair being the smallest.

The shagbark hickory bears compound leaves, each one consisting of five or seven leaflets. These leaves, like others in this series, are reproduced one-fifth natural size.

The single terminal leaflet is borne on a short stalk. The leaflets vary from oblong to oblong-lanceolate or ovate-lanceolate, or the terminal one may be obovate. They are four to six inches long, acuminate (long-pointed) at the apex, inequilateral at the base, regularly serrate and densely ciliate along the margins except near the base. Firm though rather thin-textured at maturity, the leaves above are dark yellowish-green and smooth, while beneath they are pale and either smooth or slightly short-hairy.

White Ash (*Fraxinus americana*). There are about a dozen kinds of ash in the eastern states and of these the white ash is by far the most abundant around New York. Though the leaves of ashes are pinnately compound with an odd terminal leaflet, as in the hickories, all ash trees may be distinguished at once from the hickories by the paired arrangement of their leaves, which always arise opposite each other on the branches, rather than in spirally alternate fashion. In the white ash the leaves are usually eight to twelve inches long and borne on stout grooved petioles. The five to nine (usually seven) leaflets are all stalked and are arranged (except for the terminal one) in pairs along the rather slender rachis. They vary from ovate or ovate-lanceolate to oblong, or the terminal one may be oblanceolate. In occasional specimens they may be somewhat sickle-shaped. Usually three to five inches long and one to two inches wide, they are acute or long-acuminate at the apex, rather unequally short-cuneate or rounded at the base, and entire or obscurely crenulate-toothed along the margins. At maturity they are thin-textured but firm, dark green and smooth above, pale green and either smooth or hairy and somewhat glaucous beneath. Leaves with five and seven leaflets are shown at the bottom of the picture.

American Elm (*Ulmus americana*). This tree is certainly one of the best-known and best-loved of all eastern American trees. Although we have several kinds of elms in the eastern states, it is the American or white elm which is the outstanding and most beautiful one. The leaves are simple and are borne in distichous, or two-ranked fashion, like those of the American linden. The blades, as seen at the left of the photograph on page 187, are ovate-oblong to obovate in outline, two to six inches long and one to three inches wide, acuminate at the apex, and obtuse or rounded

The white ash, like all of its relatives, has pinnately compound leaves which are borne opposite each other on the twigs. They are smaller than those of the hickory and of a very different texture.

and inequilateral at the base. At maturity they are dark green and slightly roughened or almost smooth above, and paler and either softly hairy or smooth beneath. The margins are regularly but rather coarsely serrate and each tooth is again serrate with smaller teeth along its margins. The numerous parallel veins, which are arranged in pinnate fashion, are usually, like the midrib, impressed or sunken above and quite prominently raised beneath. Each vein continues directly to the point of one of the teeth. The short petioles are stout and only about one-quarter inch in length. Two individual elm leaves with different types of leaf-blades are shown at the lower right. The related slippery elm (*Ulmus fulva*) is also common here, but may be distinguished by its leaf-blades being extremely rough-papillose above and white-pubescent beneath.

Yellow Birch (*Betula lutea*). At the right of the photograph are shown the leaves of the yellow birch, one of the commonest of the sixteen birches of the eastern states. As is true of most birches, the leaves are spirally alternate, but are mostly borne on greatly abbreviated twigs or "spurs" on the branches, where they are so crowded that they appear clustered. In the photograph each spur bears two leaves. The leaf-blades of the yellow birch, a separate one of which is shown at the left, are ovate to oblong-ovate or elliptic in outline, one and one-half to four and one-half inches long, one and one-half to two inches wide, acute or acuminate at the apex, rounded, broadly wedge-shaped or slightly heart-shaped and often inequilateral at the base. At maturity they are dull, dark green, and smooth above, pale yellowish green and hairy (at least on the veins) beneath, with nine or more rather straight and parallel veins on each side of the midrib. The margins are sharply doubly serrate as in the American elm. The petioles are slender, pale yellow, hairy, and three-quarters to one inch in length. The sweet birch (*Betula lenta*), also common here, has very similar leaves, but the leaves of the gray birch (*Betula populifolia*), so common as a pioneer plant in old fields and pastures, are conspicuously triangular to narrowly rhombic-ovate, with a long-attenuate tip.

The frequently rough-surfaced leaves of the American elm are shown at the left, with two individual leaves below, while the thinner, smoother leaves of the yellow birch are shown at the right with a separated leaf above. Besides the appearance of the surface and the feel of the leaves, they may be distinguished by examination of the tips of the veins.

Raymond H. Torrey

"A valiant fighter for the preservation of the wilderness areas of the United States and for their judicious development for enjoyment by those who could appreciate them."

Thus did the New York Herald Tribune on July 16 appropriately describe Raymond H. Torrey, whose death on his fifty-eighth birthday had occurred the preceding day.

Mr. Torrey had been a member of the Corporation of the New York Botanical Garden since 1933 and a member of the Board of Managers since 1935. Last January he was elected President of the Torrey Botanical Club, which was named in honor of a remote relative of his, the early American botanist, John Torrey. He had been elected to membership in the organization in 1920, and had long been chairman of the club's field committee.

A newspaperman from the age of 18, he worked with the City News Association when he came to New York from Massachusetts in 1903, and later became night city editor of the New York American and then of the New York Tribune. Of late years he confined his news writings to a column, "The Long Brown Path," which he prepared from his home in Queens for the New York Post. Meanwhile he was following his many outdoor hobbies of preservation of native wild life, tramping, mountain climbing, and the study of botany and geology, but particularly of mosses and lichens, on which he had published. He was the author, with Frank Place and Dr. R. L. Dickinson, of "The New York Walk Book," which became the Bible of thousands of nature lovers who liked to tramp the woods and climb the hills and mountains near the metropolis.

Always eager for others to share in his enjoyment of life out of doors, Mr. Torrey pursued his interests through many associations, in which he developed a host of lifelong friendships. As a member of the board of managers of the Appalachian Trail Conference, he was a factor in the development of the Appalachian Trail, which now extends for 2,050 miles along the crest of the mountains from Maine to Georgia. He was also chairman of the New York-New Jersey Trail Conference, which maintains marked paths for hikers in the metropolitan area. He had been at various times a secretary for the New York State Council of Parks, National Conference on State Parks, and the American Scenic

and Historic Preservation Society, for which he had marked many spots in New York with descriptive tablets. At the time of his death he was secretary of the Association for the Protection of the Adirondacks. He was also a member of the American Association for the Advancement of Science, American Geographical Society, American Museum of Natural History, and the Appalachian, Green and Adirondack Mountain Clubs, and the Fresh Air and Tramp and Trail Clubs.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Forty Years of Gardening

FORTY YEARS OF GARDENING. Anna Gilman Hill. 301 pages, 52 illustrations from photographs, index. Frederick A. Stokes, New York, 1938. $4.

If ever a gardener-author took a fellow gardener by the hand and walked out into her flowered knowledge, it is Anna Gilman Hill, who has expressed the very essence of generosity and personal knowledge in her book, Forty Years of Gardening. For the amateur she gives many useful lists in detail and relates her successes and her failures. For the gardener of like experience she gives reminiscences of details in gardening which are as delightful to read about as any personal recalling of event could be. Her sense of humor bubbles up through the pages with never-ending surprises and finally the beauty of her recollection and tribute to those of her family who gardened before her is so exquisitely touching that one wishes every little girl could begin where she did—with one hand in that of a gardener-mother or uncle and the other hand holding a little trowel.

Mrs. Hill's greatness of heart finds an expression in her love of her flowers, and her remarkably ordered memory enables her to give to us her knowledge in a clear, helpful form. Forty Years of Gardening belongs on bookshelves of gardeners, and also of those who can appreciate a delightful human document.

MARTHA BROOKES HUTCHESON.

Complete, Compact Notes On the Iris Family

HARDY BULBS: IRIDACEAE. Charles Harvey Grey. 403 pages. Illustrated with drawings and colored plates by Cecily Gray. Glossary. E. P. Dutton Co. New York, 1938. $8.

Lt. Col. Grey, writing from Kent, England, frankly admits that the title page of his new book worries him because Hardy Bulbs is a misnomer. One does not read very far before finding that neither 'Hardy' nor 'Bulbs' is an accurate description for this work on the Iridaceae. But what's in a name, when we have been given a reference book that the gardener will certainly wish to possess, if he specializes in any one genus of the family?

It is the most complete work on the Irids that I have come across. In short it might be called Dykes' Genus Iris, Maw's monograph on the Crocus,—and every other work herewith connected brought up to date. Added to this, the book is not cumbersome, but can be described as a practical working tool.

Many of the subjects, as for instance, some Gladiolus species, may be of little garden value; but everything will be considered necessary in the opinion at least of the plant breeder and the collector. Several genera are very rare in cultivation. Indeed it is doubtful if certain of them have ever been recorded in gardens. Included among the unusual are Chamelum, Cleanthe, Synnotia, and Syringodea.

The Crocus and Iris genera are of greatest interest to me and I read of

many species with a very definite sense of covetousness. It is a relief to find that in certain cases the author has included species that even he was unable to procure, for example, *Iris falcifolia*, of which I had thought we had at last found seed, but which has turned out to be as elusive as the pimpernel. It almost made me glad to note one omission, so exhaustively does he deal with species. The white form of *I. gracilipes*, considered a choice possession by American Iris fans, is not mentioned. It is difficult to understand why he says that the name *I. cristata* is occasionally used as a synonym for *I. tectorum*. Surely the word "erroneously" was meant to be inserted here.

There are 47 plates, of which 15 are colored. These lend an added attraction to the book.

It would be presumptive to discuss the taxonomy. Sufficient to say that for the gardener, the descriptions would appear to be done in as simple language as seems possible. Above all, it is easy to recognize that the author is a true gardener and a keen lover of his plants as nature supplies them.

By and large, this is an excellent book and I understand that similar volumes on other families are on the way by the same author. I look forward to the pleasure of becoming acquainted with them all.

J. G. Esson

On Home Grounds and Plant Materials

PLANNING AND PLANTING YOUR OWN PLACE. Louis Van de Boe. 290 pages, illustrated with halftones, plans, and drawings. Indexed. Macmillan, New York. 1938. $4.50.

Of books that discuss ornamental plant materials subjectively that is, tell how to grow and use them—there are legion. Of books dealing primarily with the arrangement of home grounds, in which plants are treated objectively, if at all, there are also quite a number. Those that attempt to do both are comparatively few —and Mr. Van de Boe's is one of them.

Considering the size and complexity of the subjects, let alone the difficulty of combining two styles of treatment, he has done a good job. He has covered a remarkable amount of ground in a simple, commonsense, constructive manner; he has brought together in convenient form a lot of information that can be understood and used; he gives evidence of having done many of the things he wri about and also of having thoughtfu considered the findings and recommen tions of others -both of which attribu are always welcome in a writer on hor cultural matters.

The question may suggest itself as whether many owners or prospecti owners of homes who will buy such book are likely to really do much of t actual work it deals with: grading t lawns and terraces, constructing wal and drives (walls, by the way, are mentioned), making lawns and flow beds, planting the larger trees and shrul and later taking care of the heavier ma tenance tasks. Yet unquestionably t man who knows how these things shou be done is in a far better position to ha them done right by the one he emplo For the same reason, the genero amount of space the author gives to d scriptions of all kinds of plants—especial woody ones—and their particular valu and requirements, is to be commende even when one gives a nurseryman *ca blanche* it is interesting, satisfying, worth while to be able intelligently appraise what he provides. Much of th information is offered compactly in tabl or lists (Mr. Van de Boe calls the charts), as well as in the readable te And in his recommendations for partic lar planting layouts around hypothetic houses, he goes farther than most autho by helpfully giving definite figures as what *good* nursery stock (obviously t only kind to buy) is likely to cost.

It is hoped that these inadequate brief comments will give an impressi of a book that has stimulated (and r warded) careful examination and th merits thorough consideration by am teurs, whether or not they are going make their own gardens; by professiona who want to keep up with the times a the fashions in home landscaping, and commercial horticulturists who neve especially these days, can afford to l their customers come to know more abo their business than they themselves do.

E. L. D. Seymour.

Guatemalan Tale

THE HOUSE IN ANTIGUA. Lo Adamic. 300 pages, illustrated w photographs. Harper & Brothers, N York, 1937. $3.

While Louis Adamic's Guatemalan "a venture in beauty" is neither a botanic nor a horticultural book, it contains ju

enough reference to Wilson Popenoe and his work with tropical fruits to claim a place on the lighter side of a scientific library. Moreover, it is a book which the reader will never fail to pass on to his friends, for the sheer enjoyment of the story of the centuries which it contains and for the pleasant flow of language through the pages. That is why it is recommended here among such technical and horticultural volumes as are ordinarily reviewed on these pages.

CAROL H. WOODWARD.

The Care of Trees in Quantity

FOREST PROTECTION. Ralph C. Hawley. 262 pages. Glossary and index. John Wiley & Sons, New York, 1937. $2.75.

Leaders in the lumber and pulp industries, members of conservation commissions, law-makers who must decide on worthwhile appropriations for forest protection, as well as those who are seeking general information on this subject, will find in Hawley's book interesting and profitable reading. It is in no sense a text-book on the subject or one of general reference, although each of the twenty-three chapters closes with a list of twenty or thirty titles on subjects related to those treated in the chapters.

Two very short chapters on protection against fungous parasites and insect pests illustrate the author's aim when he says that the book is devoted to underlying principles rather than detailed instructions for carrying on specific types of work.

The author gives as his opinion that no practical methods for applying fungicides and insecticides to forest stands have as yet been perfected. Such efforts, he says, are better confined to nurseries. Only three or four fungous diseases of trees and as many insect pests are mentioned. The practising forester, he maintains, should recognize the symptoms in each case and leave the identification of parasites and pests to the forest pathologists and entomologists. The omission of the details with reference to the life histories and identification of parasites makes the book more interesting reading.

Nearly half of the book is concerned with forest fires, where the author is at his best. A glossary of seven pages defining terms used in fire control work is given in the appendix.

B. O. DODGE.

Current Literature At a Glance*

By Carol H. Woodward

Botanical Magazine. An unusual volume of *Curtis's Botanical Magazine* has just appeared, 17 years after its date-line. As explained in a preface, this volume, Number 147, was omitted in 1921, when the Royal Horticultural Society took over publication of this magazine. Consequently, Reginald Cory, who died in 1934, before the work was finished, offered to finance the entire missing volume. In an effort to determine the best means of reproduction of flower plates, three types were interspersed in the book; some are done by lithography, some printed by a mechanical process, and some are colored by hand. All are of the usual high quality which has been maintained by this publication for more than a century and a half. Most of the 57 plant subjects which are treated have been drawn, according to the desire of Mr. Cory, from the Royal Botanic Garden at Edinburgh.

Sempervivums. R. Lloyd Praeger's important treatment of the genus *Sempervivum*, published by the Royal Horticultural Society of London, has recently been added to the library. This work is an essential for anyone attempting to identify a member of this greatly confused genus.

Nature Study. A complete set of the useful series of leaflets published by the School Nature League of New York is now in the library of the Botanical Garden. The May number gives descriptions by Arthur Harmount Graves and outline drawings by Maud H. Purdy of the leaves and fruits of ten common street trees.

Quick Propagation. Albert G. Snow, Jr., of the Northeastern Forest Experiment Station advocates the use of indolebutyric acid for the rapid vegetative propagation of cuttings, particularly choice hybrids and selected strains, of forest trees. His report of extensive experiments with trembling and large-toothed aspen trees is given in the *Journal of Forestry* for June.

Color. The weekly editorial in the *Gardeners' Chronicle* for June 25 points to the "brilliant researches" on the dis-

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

covery of "both the nature and the way of inheritance of the colors of flowers" done by Rose Scott-Moncrieff of the John Innes Horticultural Institution, and published in the *Journal of the Horticultural Education Association* for the current year.

Aleutian Islands. Two volumes by Eric Hultén, who recently spent two weeks at the Garden, describe at length the flora of the Aleutian Islands, and give an outline of the quaternary history of the life of the far north. Both volumes are amply illustrated and completely annotated, the one on the living flora with the author's own photographs. Dr. Hultén said, while in New York, that the magnificent scenery and the equable climate of Kamchatka, on which he published a flora in 1930, makes part of the region worthy of becoming one of the world's most popular vacation resorts.

Plant Names. In the section of the July *Gardeners' Chronicle of America* devoted to the American Rock Garden Society, P. J. van Melle contributes some enlightening paragraphs in which he evaluates several confusing plant names and gives distinctions between similar plants which he has grown in his garden and checked with original botanical citations. He deals with those plants which are commonly known as *Ajuga Brockbanki* and *Narcissus Pseudo-Narcissus minimus*, and gives distinctions between *Anemone apennina* and *A. blanda* and also between *Convolvulus lineatus* and *C. incanus*.

Japanese Beetle. Anyone living in Connecticut—or, for that matter, anywhere in the region infested by the Japanese beetle—will find Bulletin 411 of the Connecticut Agricultural Experiment Station a useful booklet for reference, especially at this season. Prepared by W. E. Britton and J. P. Johnson, it relates the history of this devastating pest in America, the life history of the individual beetle, illustrated with enlarged drawings and photographs, and gives detailed directions for control on all types of plants.

Mushrooms. The January-February number of the *Philippine Journal of Science* devotes its 128 pages and 79 full-page plates to a presentation of Philippine mushrooms by José Miguel Mendoza. While most of the illustrations are reproductions of photographs, several are from paintings in water-color.

Notes, News, and Comme

Community Life. Dr. William J. R bins addressed the joint conference educators and other community work at Teachers College, Columbia Univ sity, July 22, on "The Contribution Botanical Gardens to Community Life

Kew Student. The third exchange s dent to come to The New York Bota cal Garden from the Royal Botanic G dens at Kew, England, is Philip Cha ler, who arrived in New York July for a year of work here as a stud gardener. Fraser MacCartney, who The New York Botanical Garden's change student, sailed toward the end June for his year at Kew.

Daylilies. Gardeners and nurseryn in exceptional numbers have visited display garden of daylilies this ye which now contains more than 200 nam horticultural clones besides many spec of *Hemerocallis*. The display enables th to make their own decisions regard the relative merits of the many clo which are now being offered in the tra

Visitors. Dr. H. S. Jackson, profes of mycology at the University of Toror spent three days at the Garden in ea July working on the Thelephoraceae. I Stanley A. Cain of the University Tennessee spent most of July working the Garden.

Lilies. Around 75 enthusiasts and perts in lily culture gathered at The N York Botanical Garden July 2 for an day pilgrimage under the auspices of lily committee of the National Hortic tural Society. After inspecting the w on lilies, particularly on *Lilium tigrin* being done at the Garden under the rection of Dr. A. B. Stout, who v chairman of the committee in charge the day's trip, the group drove to Boyce Thompson Institute for Plant I search in Yonkers, then to the gard of Dr. L. H. Abel in White Plains a of Mrs. Helen M. Fox in Peekskill. formal talks and discussions took pl during the day, at which it was rec mended that lilies be raised from seed an effort to obtain plants free fr mosaic disease.

THE NEW YORK BOTANICAL GARDEN

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, semi-annual, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twentieth volume. Subscription price, $10 a volume (two years). Not offered in exchange. Free to members of the Garden.

Journal of The New York Botanical Garden, monthly, containing notes, news and non-technical articles. Subscription, $1 a year; single copies 10 cents. Free to members of the Garden. Now in its thirty-ninth volume.

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Contributions from The New York Botanical Garden. A series of technical papers written by students or members of the staff, and reprinted from journals other than the above. Price, 25 cents each, $5 a volume. In the fourteenth volume.

Memoirs of The New York Botanical Garden. A collection of scientific papers. Volumes I-VII. Titles on request.

Direct all orders to The New York Botanical Garden, Bronx Park, New York, N. Y.

* * *

DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

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CAROL H. WOODWARD, Editor
SEPTEMBER, 1938

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PUBLIC EDUCATION

One of the functions of The New York Botanical Garden, according to the Articles of Incorporation, is to afford instruction in the botanical sciences.

A phase of this work is the informal information service in which each member of the staff participates in his own field without cost to the public. Another phase appears in the museum and greenhouse exhibits and the accurately labeled collections of living plants; others occur in the services of the library with its wealth of books, in the provision of leaflets to serve as guides through different parts of the grounds and buildings, and the appointment of staff members to conduct special groups of visitors around.

The publications issued by the institution and the aid given to scientists working on special problems, all are related, at least in part, to the Botanical Garden's program of public education.

For those persons who wish to take their learning casually, the Garden offers free lectures on Saturday afternoons.

For those who have a serious interest in gardening, either professional or amateur, the Garden offers special opportunities through its courses in the sciences underlying horticulture and in practical gardening. News concerning both these courses will be found in this number of the Journal.

To quote Professor Salisbury in the issue of last May: "From the cultural point of view, plant life and all that it implies may be regarded as the foundation of a vast extent of human activity and the basis of a large and essential part of every human environment."

The invigorating autumn air should stimulate people's desire to learn more, both scientifically and practically, of the wonderful world of plant life. The Botanical Garden offers its services, and with them its exhibits and its well planned courses.

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VOL. XXXIX SEPTEMBER, 1938 No. 465

Trees and Shrubs In New York City And Some Observations On Their Growth

By Nelson Miller Wells
Landscape Architect

I.

MAN-MADE structures in a city and representatives of the plant kingdom are not congenial neighbors. Certainly in a city like New York there are numerous conditions which are unfavorable as well as unnatural for the growth of plants. Acres of pavement, massive shafts of towering masonry which absorb heat and reflect sunlight on one side, and cast impenetrable shade on the other side, atmosphere polluted by smoke, dust and gases, and —as if these were not enough—a deficiency of good soil: all conspire to make a difficult environment for plants. Some kinds succeed while others fail in this situation and it is interesting and important to note which are the more tolerant.

A luxuriant vegetation unique in its geographic location originally covered the area we now know as New York City. A northern flora reached its southern limits here and a southern range of plants was represented by numerous outposts. There were combinations of growth resulting from an adjustment over a great span of years after the last retreat of the ice cap. The terminal moraine lay diagonally across the city area leaving eroded soils and rocks in the northern half, morainal debris across the center, and an outwash plain to the southward. Here also converged the northern limits of the fall line and coastal plain. Nowhere else in America was there such an unusual combination. The variety of resulting soils was great and the range of plants was equally diverse. In fact, more than 400 species, or nearly one-half of the vascular plants accredited to the northeastern United

States and Canada, reached their distribution outposts within the short radius of a few miles of this center.

But with the steady increase in the development of the city, today there are only faint remnants of this one-time forest vegetation. These exist primarily in the 20% of the 315 square miles of city land which has not yet been developed (mostly coastal wastes) or in the parks and cemeteries where they have been preserved or re-established.

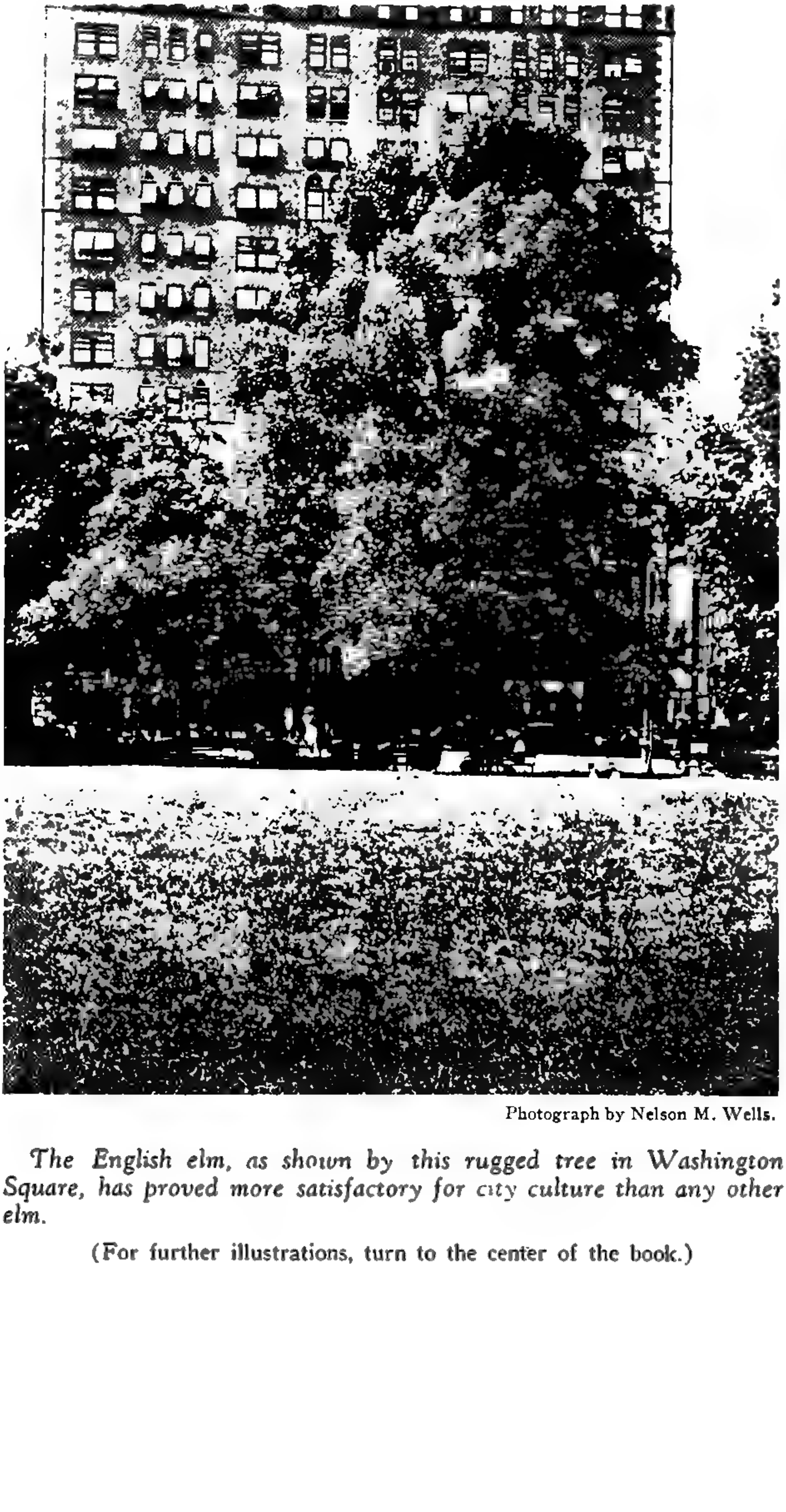
Many structures in the city lie below the surface of the ground. Transportation and other utility conduits are ramified in the subsoil and these together with deep basements change the water table and the movement of subsoil water. Soil and rock excavated for these structures have been spread to fill valleys and to build up shore lines until the physical conformation of the city has been greatly changed. With each layer of this inert material the natural topsoils have been buried deeper.

Leaking gas mains, and there is an unbelievable number of these, have caused the loss of many plants. It takes only a small amount of illuminating gas to impregnate a large volume of soil; the poisonous effects on plants are very definite and persist for a long time.

Of course new soils have been brought into the city from the neighboring country. Some of these are sandy, some clayey, while others vary greatly in their chemical qualities and in their amount of plant food. The resulting accumulation of soils, some from great depths, others from varying and distant sources, have produced a hodgepodge of indescribable variety and spotty distribution. For the most part they are neutral to acid in their chemical reactions. Their food values have been depleted by a forced draft of plant growing, and with an almost total absence of humus they offer little promise in supporting vegetation.

At the level of the ground other factors affect plant growth. Pavements and other constructions not only prevent the rainfall from reaching the soil but actually collect the water into storm sewers which transport it straight out to sea. Exposed soil is caked with soot and other deposits and it is almost as impervious as the pavements. Consequently but a small amount of the natural rainfall ever enters the soil.

Another, and by no means the least, of the handicaps for vegetation is the polluted air of the city. Gas from automobiles



Photograph by Nelson M. Wells.

The English elm, as shown by this rugged tree in Washington Square, has proved more satisfactory for city culture than any other elm.

(For further illustrations, turn to the center of the book.)

and dust are perhaps not so damaging as the ever present smoke. To date there are no ordinances to control the proper combustion of fuel in heating and power plants. The result is that reeking stacks from the New Jersey coast are augmented by those in the city to the detriment of the health of both plants and man.

The damaging effects of smoke are numerous. Certain gases in the smoke, such as sulfur dioxide, poison the plant tissues, and the unconsumed carbon and tarry particles form soot which tenaciously adheres to everything it lies upon. It is known to build up an actual deposit which clogs the leaf pores; it forms a film which prevents the sun's rays from reaching the chlorophyll and reduces the power of the leaves to assimilate food from the air.

With subsoil waters constantly changing, humus and plant foods deficient in the soil, surface water collected and diverted, and shade, wind or heat supplementing a poisoned atmosphere, the plants are constantly struggling for existence. In this state they are in a weakened condition and become ready hosts for insect depredations and plant diseases. All the cultural and remedial treatments given to plants under normal conditions are needed here tenfold.

The best results become merely the semblance of plantings with no hope of ripe and picturesque maturity. The sprawling growth of the city has caused almost as complete an annihilation of vegetation as the glacier caused. But if we will take the necessary pains and precautions some of the most tolerant growth may be restored.

Strangely enough, several of the kinds of plants which grow best under the most trying conditions are of Asiatic origin. Here we find the tree-of-heaven and the maidenhair-tree. Next in importance are certain of our native woody plants. Among these it would appear that the ones which have glossy leaves and can endure droughts and those which prefer soils on the acid side of the scale are the most successful. Perhaps it is because of the pall of murky smoke and the presence of tall buildings that so many of the plants which succeed are those which grow naturally in partial shade.

So far as the writer knows there has been no actual survey of vegetation in New York City to determine the degree of tolerance possessed by different plants. Such surveys have been conducted elsewhere usually in connection with damage claims against factory

districts. With the wealth of new plant material added to our city parks since the spring of 1934 there would appear to be an unusual opportunity for such observations within the next few years.

In 1913 a survey of Des Moines, Iowa, was made and a zone map prepared showing seven belts of varying intensities of smoke damage. In the first belt, a narrow 500-foot strip nearest the factories and known as the general elimination belt or belt of restricted annuals, there were three representative plants, old-witch grass (*Panicum capillare*), crab-grass (*Digitaria sanguinalis*) and prostrate pigweed (*Amaranthus blitoides*). In each succeeding zone there was a marked increase of plant varieties with the first woody plants, willows and poplars, appearing in the third belt. This was in the business section of the city.

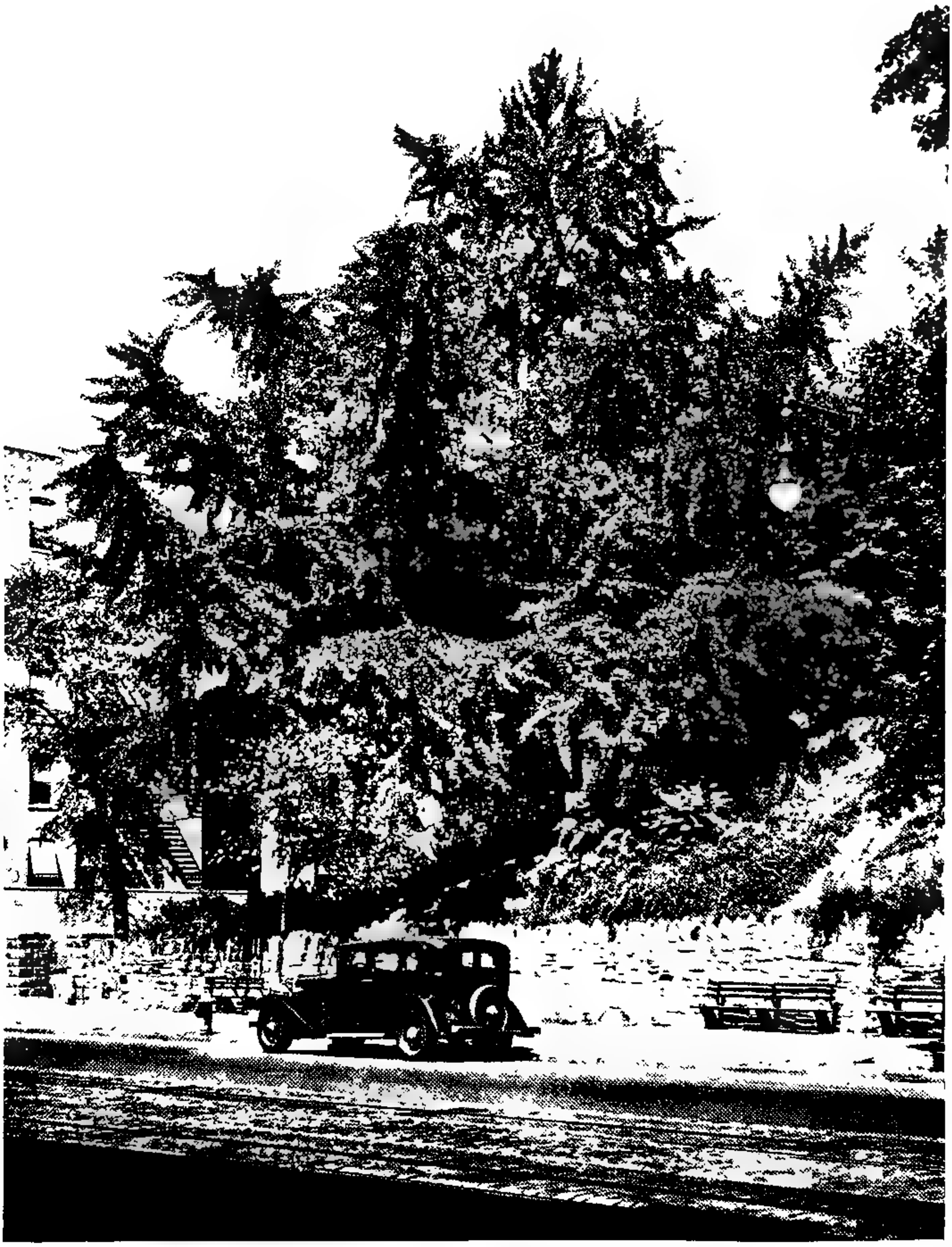
The lists of plants which follow in these pages are not based on a planned survey but are the cumulative observations from traveling about in New York City. Without doubt, a number of plants which succeed in one location would survive and possibly thrive in others if they were to be planted and properly cared for. The lists of plants for the three zones are therefore tentative.

The First Zone

The areas of the city referred to as belonging to the first zone are not only the most intensively built up portions but they are also the areas where city smoke is the most prevalent. In general these comprise the lower east side of Manhattan, the western portions of Brooklyn and Queens and lesser areas along the southwestern parts of the Bronx. The smoke from the factories along the New Jersey shore is supplemented by smoke from the factories and heating plants within the city. This is carried by the prevailing southwesterly winds and affects these districts most seriously.

Numerous other factors play their part in the success or failure of plant growth so that it can not be positively said whether it is smoke, wind, shade, dust, heat, or lack of moisture that spells the doom of one plant or the success of another in a particular location.

The most conspicuous growth in the first zone is the tree-of-heaven. Undoubtedly many specimens have been planted but most of them, judging from their present locations, have come from wind-spread seeds. Heavy shade and gusty winds which tear the brittle wood may account for the irregularity of growth. Young



Photograph by Fleda Griffith.

One of the oldest of the ginkgo, or maidenhair, trees in New York is this magnificent specimen which overhangs a steep bank on Broadway at 212th St.

trees up to twenty feet in height are usually quite symmetrical but larger trees are apt to lean sideways and they usually have irregular crowns. The reason why large or mature trees are seldom found is more likely because building improvements call for their removal rather than because they have been killed prematurely by adversities.

Of the trees which have been planted, poplars, willows, black locusts, catalpas, American and English elms and London planes are next in importance. While the maidenhair-tree is probably as tolerant as the tree-of-heaven there are fewer examples and these are mostly street trees.

Poplars and willows are prohibited by City ordinance from being planted in public places. Nevertheless, many poplars have been planted as street trees in different parts of the city. There are several avenues of large, luxuriant Carolina poplars, but their roots work havoc with sidewalks and underground utilities. Their soft wood is susceptible to breakage in wind storms and in spite of their thrifty growth they are really troublesome trees.

Black locusts have frequently been planted in congested city areas and it would appear that they are less troubled by borers than in suburban districts. Perhaps the borers cannot stand the polluted atmosphere. From one shipment of locusts about 1930, a part were planted in lower Manhattan and the balance put in a nursery in northern Manhattan. Each group was sprayed for borers during the same seasons. The downtown trees are still practically clean, while the nursery trees became so riddled with borers that they have since been cut down.

The London, or European plane, as it is commonly called, is generally considered the best tree for street planting in "deep" city conditions. It possesses the qualities of fast growth, a reasonably straight trunk, a well shaped crown, branch structure adaptable to pruning and shaping, and a considerable tolerance to drought, reflected heat, and smoky air. The annual sloughing off of its outer bark is sometimes thought to be a factor favoring its tolerance of the prevalent sooty deposits. The American plane is nearly as tolerant but because of its greater susceptibility to anthracnose, a fungous disease of the leaves, and its freer branching habit, it is less commonly planted.

While the American elm is not actually credited with being able to survive under severe city conditions, it seems to be surprisingly tolerant. However, in various park plots in congested areas where

several kinds of elms have been planted there are a number of instances where forms of the English elm have attained a greater size and appearance of thrift than their American cousin. Although there are no large Chinese elms, because of their more recent introduction, it would appear that these strains may prove to be even more tolerant than the others. As a general class, however, the elms can not be considered to be as resistant to drought and polluted atmosphere as the other kinds of trees mentioned in this class.

Among the shrubs, California privet appears to be the most enduring. The severe winters of 1934-35 and 1935-36 caused the loss of many plants but those which survived the low temperatures seem extraordinarily capable of standing the rigors of the city. Amur privet, although not so robust in habit, is more tolerant to the cold and may prove to be better than California privet when it is more fully tried. Regel's, Ibota and Ibolium privets all appear to be nearly as enduring as the California strain.

Occasionally a rose-of-Sharon will thrive in a trying situation. Other small trees and shrubs which rank as the most successful in the first zone include the Siberian pea-tree, fringe-tree, cockspur-thorn, five-leaved aralia and devil's walkingstick.

Trees and Shrubs of the First Zone

Five-leaved Aralia	*Acanthopanax Sieboldianus*
Tree-of-Heaven	*Ailanthus altissima*
Rose-of-Sharon	*Althea rosea*
Devil's Walkingstick	*Aralia spinosa*
Siberian Pea-tree	*Caragana arborescens*
Catalpa	*Catalpa spp.*
Fringe-tree	*Chionanthus virginica*
Cockspur Thorn	*Crataegus Crusgalli*
Maidenhair-tree	*Ginkgo biloba*
Amur Privet	*Ligustrum amurense*
Ibolium Privet	*Ligustrum Ibolium*
Ibota Privet	*Ligustrum Ibota*
Regel Privet	*Ligustrum Ibota Regelianum*
California Privet	*Ligustrum ovalifolium*
American Plane	*Platanus occidentalis*
London Plane	*Platanus acerifolia*
Poplar	*Populus spp.*
Black Locust	*Robinia pseudoacacia*
Willow	*Salix spp.*
American Elm	*Ulmus americana*
English Elm	*Ulmus procera*
Chinese Elm	*Ulmus parvifolia*

(*To be continued*)

The Professional's Point Of View

By J. G. Esson

MRS. COOMBS' remarks in the July issue of the Journal caused me to recall my feelings on eating my first tomato! I can remember how pleasing to my palate the red-skinned fruit promised to be and how my views were changed when I tasted it. But time has taught me that there is an immense amount of goodness in tomatoes just as it has in the case of amateur gardeners.

I believe that the professional gardener, more so today than ever before, aids the amateur to subscribe to his work. Indeed, it would be difficult to point to any other profession or line of life where the skilled practitioner has shown such eagerness to encourage the amateur and to explain to him fully the innermost secrets of his science or craft.

It is very true that the professional does think "with unconcealed scorn" upon some amateurs. Never, however, can he be accused of doing so where the amateur seems likely to make some worthy contribution to horticulture or when he has a genuine interest in improving his own ability. Unfortunately, in the minds of some amateurs and some professionals too, one personal success will magnify out of all proportion the value of their work as well as the scope of their ability. This is not the trait of the true gardener who knows that "a little knowledge is a dangerous thing."

How the professional gardener or scientist can help the amateur more than he is doing these days is surely something worthy of a great deal of serious thought. It would be to the professional's advantage if it could be done. But, unless one has the urge, will flower shows or a diffusion of daffodils be the birth of new gardeners any more than an introduction to logic will convince men of spiritual truths?

That our people are becoming more garden- and tree-minded is evident from the garden cities that have grown like mushrooms on all sides of New York these last few years. However, although architects have exceeded themselves in the design of the houses, it is to the plantings that these homes owe much of their popular appeal. For them we can almost repeat what was written in England one hundred years ago:

"When lavish art her costly work had done
The honor and the prize of bravery
Was by the garden from the Palace won."

If one will take heed of what may be gleaned in the records of our horticultural magazines and books, amateurs have blazed the trail in many of the most difficult phases of gardening. We have today instances of amateur gardeners leading the field in the culture of the choicest lilies, narcissi, irises, delphiniums and rock garden plants. Some of the most readable garden books, full to the last page with common-sense, valuable garden information, have in the past been written by amateurs. We at once think of Dean Hole's "Book of the Rose"; "My Garden" by Eden Philpotts, or Susan Delano McKelvey's lilac monograph. When we consider purely scientific work by an amateur, the most appealing might be Mendel's theory.

We are blessed today with three definitely distinct types of amateur gardeners. The first kind consists of those who seem to be certain of success with all they plant. Theirs are green fingers! An uncanny affinity to the plants would appear to be their guide. Sometimes they will be ignorant of the history or even of the botanical names of their plants, being content with their local appellations; but plants grow for them, nevertheless.

The second type is rather short-lived. As gardeners they set out to achieve in one season what their neighbor has struggled for through many years of bitter experience. As the professional would say: "They want to grow orchids before they can crock pots." Frankly, they are not gardeners.

The third is the type in which the professional is most interested. These have the urge to do gardening. Soon they will seek out the professional and ask of him all manner of questions concerning fertilizers, seeds, pruning, etc. They are the people who read all the gardening magazines they can get.

If the amateur gardener has the urge and his garden is within the limit of his physical attention, he is bound to have success, whether he does or does not win prizes at the shows. It is not every gardener who has the luck or even cares for competition. It will, however, be greatly to his advantage to discuss problems with other gardeners, both professional and amateur. He will be assisted still more if he becomes an active member of the Botanical Garden or joins a horticultural society that has a good library, where information garnered by scientists and gardeners the world over will be at his disposal.

Ko, the Kudzu Vine, Provides Food, Shade, Clothes, And Medicine

By W. M. Porterfield

(No. 4 of a series on Chinese Vegetable Foods in New York)

KUDZU, the common name by which *Pueraria Thunbergiana* is known to horticulturists, is a word of Japanese origin. The Chinese name is Ko. It is a rapidly growing vine belonging to the Leguminosae and bears its papilionaceous purple flowers in axillary spikes. Henry[1] has reported its occurrence all over China, "notably in the vicinity of Kiukiang." Read and Liu[2] report it definitely from the provinces of Chihli, Shantung, Kiangsi, Kwangtung, Chekiang and Hupeh.

The occurrence and use of the kudzu vine in China was first reported, according to Bretschneider,[3] by Martinus Martini in his Atlas Sinensis published in 1655. In that account he notes the fact that the natives in the city of Liping in the province of Kweichow weave a cloth from the fiber, which they make into garments most suitable for summer wear.

Later Voisin,[4] a French missionary who went to China in 1824, obtained therefrom several economic plants among which was the textile plant, Ko. Seeds were presented to the Museum of Natural History in Paris through Stan. Julien and the plants raised from these seeds were examined by Prof. Jussieu who found that it was a leguminous plant near *Dolichos bulbosus*. It was later identified as *Pueraria*.

In Japan this plant is also cultivated and it is from there that it eventually found its way into Europe. Carrière[5] in the *Revue Horticole* for 1891 quotes a letter written to him by Paul de Mortillet describing this plant, which was first sent to him from Japan in 1878. In this letter its value as an ornamental plant, its use as a source of starch, and its industrial possibilities for paper

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[1] Henry, A. Notes on Economic Botany of China. pp. 57-59. Shanghai. 1893.

[2] Read, B. E. and Liu, J. C. Plantae Medicinalis Sinensis. Flora Sinensis, A. I: #372. "Pueraria hirsuta Schneid." 1927.

[3] Bretschneider, E. Early European Researches into the flora of China. Jour. N. Ch. Br. Roy. As. Soc. **15**: 1-194. 1880.

[4] Bretschneider, E. History of European Botanical Discoveries in China. 545. 1898.

[5] Carrière, E. A. Revue Horticole **63**: 31-32. 1891.

manufacture were all mentioned. One of its remarkable traits is its power of rapid growth. De Mortillet stated that it was planted beside his house at Meylan in France and that in five years it had to be cleared away because it had grown over all available wall space. In two years it had covered an area of 28 square meters.

From France the kudzu was introduced into Germany in 1895 and was heralded as a new ornamental vine for that country. An account in *Gartenflora* for 1896 by L. Wittmack[6] expands the account that appeared earlier in France and extols its useful characteristics.

The useful tuber of the kudzu vine, shown two-thirds natural size, with the character for Ko, its Chinese name.

In New York's Chinatown the kudzu appears on sale in the form of long potato-like tubers which are trimmed at both ends as the photograph shows. It is used as a food by the Chinese chiefly for the fine starch it yields. These fleshy roots may branch and grow to great length (over a meter) assuming grotesque forms in their growth.

In brief the uses of this plant are four in number: *ornamental, nutritional, industrial,* and *medicinal.* Its value as a rapidly growing trellis vine for ornament and shade is important to gardeners.

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[6] Wittmack, L. Gartenflora 45: 401-404. 1896.

As a source of food the roots as such do not make a suitable vegetable like a sweet-potato, since they contain a great deal of fiber and no amount of boiling will make them soft. They can therefore only be used for the starch which they yield in the form of a flour called by the Chinese Ko-fen. Carrière noted the way in which the starch swells in water and stated that one teaspoonful was sufficient to make a large dish of soup. He described the starch as sweet, fine, and without odor.

In Japan the vine is also used as a forage plant for cattle.

The industrial uses arise from the fact that the best fibers from the inner bark of the vine can be made into a "grass" linen similar to that made from the fibers of *Boehmeria nivea*. In Chinese the cloth is called Ko-pu, and because it is smooth and does not cling to the skin it is favorable for summer wear. It is yellowish in color, fine and durable. The use of this fiber for making paper has also been reported. In Japan the young branches may serve as a binding material in much the same way in which osier branches are used.

As a source of beneficial as well as harmful drugs, all parts of this plant have been used both in China and Japan. Stuart[7] brings out the interesting fact that the part of the plant above ground seems to be somewhat poisonous, having emetic properties, whereas the root is "thirst relieving, antifebrile, anti-emetic, and counter-poisonous." Ko-hua, a drug coming from Canton and Ningpo, is made from the flowers. Colds, fever, influenza, dysentery, snake and insect bites, are all treated with decoctions made from the root. It is also taken as an antidote for poisonous drugs such as croton oil and is applied in cases of dog bite. The seeds are used as well as the flowers in cases of alcoholic excess. The shoots are used to stimulate milk secretion and for application on boils. Flowers, leaves, stem, roots, and seeds are used to overcome skin rashes.

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[7] Stuart, G. A. Chinese Materia Medica. Shanghai. 1928.

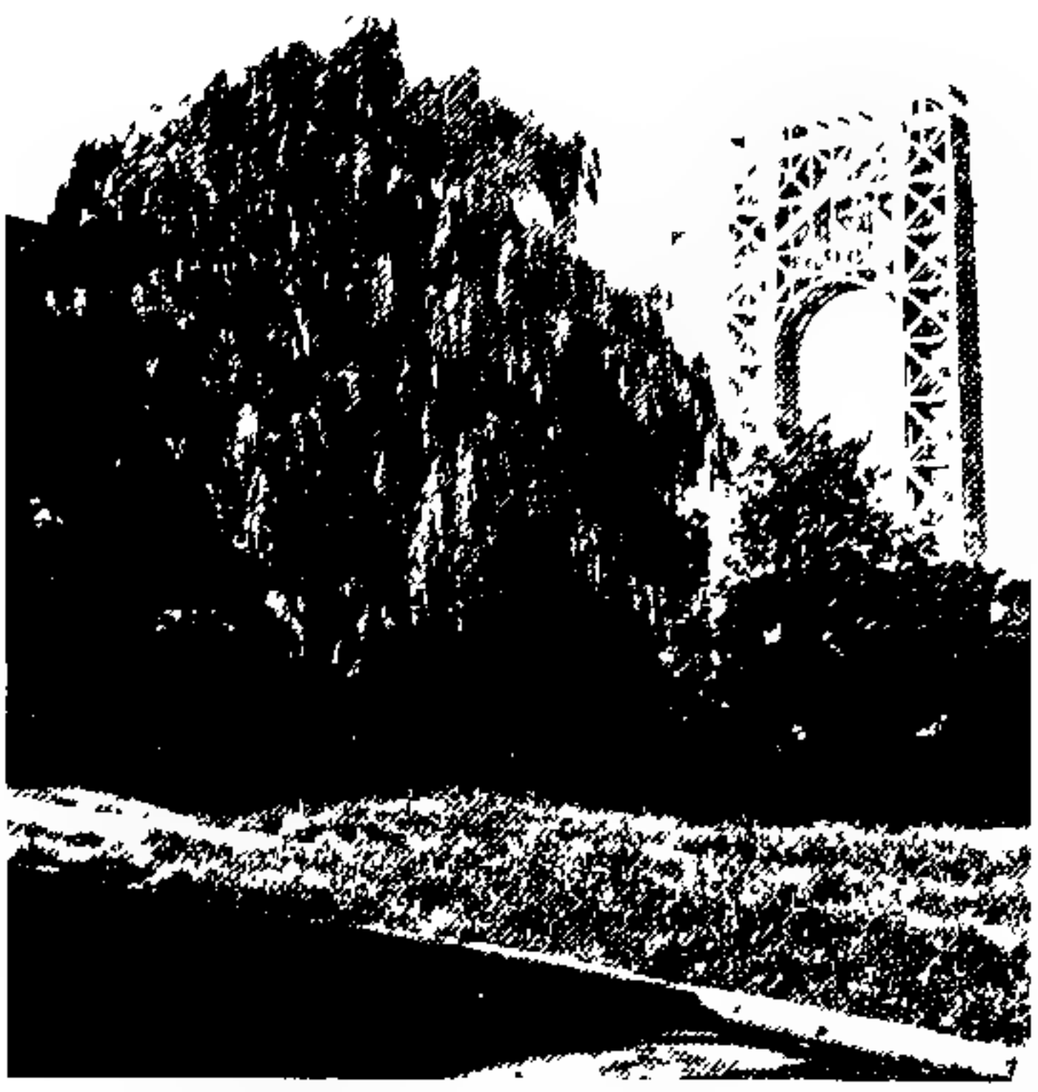
TREES WHICH TI
UNDER THE TF
CONDITIONS OF
NEW YORK CITY

1. *A thrifty catalpa in Washington Square.*

2. *Privet growing luxuriantly on Bank St. in Greenwich Village.*

3. *Willows surviving directly beside the elevated highway at Eleventh Ave. and 22nd St.*

4. *Trees-of-heaven, black locust and ailanthus trees in the Schiff Park on the approach to Manhattan*



5. *Weeping willow near the George Washington bridge.*

6. *A black locust on Sedgwick A near Kingsbridge Ro*

Photographs by
Nelson M. Wells
and
Fleda Griffith

7. *A double row of splendid London planes on Morningside Ave. from 113th St. north.*

8 *Plane-tree surrounded by pavement*

Two-Year Course In Practical Gardening

THIS course is intended to meet the needs of professional and amateur gardeners who desire to know more of the 'why', 'how' and 'when' of many operations concerned with plant growing and the maintenance of gardens. It does not treat of garden design. The full course covers two years' work and consists of four classroom subjects and two laboratory subjects, any of which may be taken separately without obligation to complete the entire course. The laboratory subjects are taught in the greenhouse and garden and afford students practice in actual work. Each classroom subject occupies twelve one-hour lectures and each laboratory subject eight meetings of from one to two hours duration. New students are admitted to the course at the beginning of the fall, winter and spring sessions. The lectures are given at a convenient meeting place in New York City on Thursday evenings from approximately the beginning of October to Christmas and from early in the New Year to the beginning of April. The laboratory meetings are held at The New York Botanical Garden on Thursday evenings during May and June. Upon the satisfactory completion of the full course a certificate is granted by The New York Botanical Garden.

The registration fee is ten dollars for each classroom subject and fifteen dollars for laboratory work.

Announcement of the exact date and place of these lectures and any other details concerning the course may be obtained by application to The New York Botanical Garden, Bronx Park, New York City.

The subjects are described below.

Fundamentals of Gardening

A study of the basic principles which underlie good gardening. Consideration is given to the structure and physiological processes of the plant and to the environment in which it grows as these factors affect garden practice, particularly in relationship to soils and their improvement, seed sowing and vegetative means of propagation, planting, pruning, watering, feeding, mulching, shading, ventilating, and disease and pest control.

Outdoor Flower Gardening

Problems discussed here include the planning, preparation, planting, and maintenance of ornamental flower gardens and lawns. Plant material considered will include annuals, biennials, perennials, aquatics, bulbs, vines, roses, and rock garden plants.

The Cultivation of Trees and Shrubs

Woody plants are dealt with from the standpoint of their usefulness in the garden and their adaptability to soils and environmental factors. Consideration is given to their botanical classification and geographical distribution. The lectures will include a general discussion of choice and lesser known woody plants as well as of the more common subjects. Particular emphasis will be placed on propagation, planting, pruning, training, feeding and other operations connected with their culture.

The Cultivation of Greenhouse Plants

A study of the methods and problems involved in the culture of indoor plants. Special consideration will be given to the propagation and growing of the more important crops, such as chrysanthemums, roses, sweet peas, carnations, begonias, poinsettias, cyclamens, primulas, forcing bulbs, etc. Attention will also be directed to a selection of the more unusual greenhouse subjects.

Indoor Gardening (Laboratory)

Actual practice in work connected with the growing of plants in cold-frames, hotbeds, and greenhouses is afforded. The student will be called upon to prepare seed flats, sow seeds, transplant seedlings, make and insert various types of cuttings, and pot and repot growing plants and prepare sprays as well as perform other work incidental to the propagation and care of plants indoors.

Outdoor Gardening (Laboratory)

The student will here be given an opportunity to gain experience in the correct handling of tools and in carrying out the various operations of the outdoor garden. He will be called upon to prepare ground for seed sowing and planting, to sow seeds and transplant seedlings, to transplant larger plants, cultivate, water and fertilize and to prune, stake, tie, and care for living plants.

Science Course For Professional Gardeners

ENROLLMENT in this lecture course is **restricted** to professional gardeners, nurserymen and commercial flower growers who have had appropriate experience *and whose qualifications are approved by a committee of professional horticulturists.* The course is not one in practical gardening but provides rather instruction in the sciences basic to good horticulture. It consists of eight of the subjects listed below, each subject occupying twelve one-hour lectures. Two lectures on different subjects are given every Monday evening from approximately the beginning of October to Christmas and from early in the New Year to the beginning of April. The full course covers two winters' work but is so arranged that the subjects may be taken separately; or a student may, if he wishes, take fewer than four subjects each winter and thus spread the course over more than two years.

Upon the satisfactory completion of the course a certificate is granted by The New York Botanical Garden.

The lectures are given at a convenient meeting place in New York City and a nominal registration fee of five dollars per subject is charged. Announcement of exact date and place of these lectures and any other details concerning the course may be obtained by application to The New York Botanical Garden, Bronx Park, New York City.

Systematic Botany A and Systematic Botany B

The study opens with a discussion of the general principles of plant classification, the significance and scope of the species, genus and family, botanical and horticultural varieties, and the nature and meaning of the scientific name. This is followed by a description of the structure of a typical flower and an explanation of the various modifications of flower-structure which are significant in classification. The use of keys in ascertaining the name of a plant is then explained. The general character of the principal groups of plants is then presented after which about thirty plant families important in horticulture are discussed in detail, including their structural characters, recognition marks, and geographical distribution.

Plant Morphology

A study of the structure and development of the root, stem, leaf, flower, fruit and seed.

Plant Physiology

Discussions of the synthesis and utilization of organic food substances by plants; their growth, development and reproduction; and the environmental factors which influence these processes, particular attention being paid to a basic understanding of the manner in which these processes are related to the various horticultural practices.

Plant Breeding

A survey of the aims, methods, and results of plant breeding, of the physical basis of heredity, of variation and of laws of inheritance. Special attention will be directed to horticultural plants in discussing such matters as the role of bud variation, polyploidy, hybridization and selection in the improvement of plants.

Ecology and Plant Geography

The lectures include an elementary presentation of the whole field, including the nature of the environment and the reaction of plant life to it, vegetative forms of plants, the organization and behavior of plant communities, and the distribution of the principal types of vegetation over the world.

Plant Pathology

A study of plant diseases caused by fungi, bacteria, slime moulds, viruses, malnutrition, and faulty cultural practices. The nature, structure, life history and classification of fungi, methods of artificial culture and inoculation into plants will be discussed. The course will also treat methods of disease control through sanitary measures, soil treatment and fungicides.

Economic Botany

An introduction to the useful plants as applied in industry, medicine and food for man, with a discussion on the origin, history and the by-products of the plants used.

Soils and Fertilizers

The constitution of soils, the manner in which their physical and chemical composition affects plants, and how they are affected by different cultural treatment; and fertilizers, their origin, use and effects on plant growth will be treated.

Entomology

The insect pests of plants, their classification, life histories, and the control measures for them will be treated in this course.

Schedules Of Classes For Fall and Winter

Science Course for Professional Gardeners

The classes will be held evenings in the Museum Building, beginning October 3. Lectures will begin promptly. Applications for admission to the course may be mailed any time prior to the beginning of a session or may be made in person at the building between 7 and 7:40 p.m. on the opening night. The professional qualifications of applicants are reviewed by a committee of professional horticulturists who reserve the right to reject any application. A nominal registration fee of five dollars per subject is charged.

Fall Session

Monday evenings, October 3 to December 19, inclusive.

Ecology and Plant Geography

Dr. H. A. Gleason, 7:45 p.m. to 8:40 p.m.

Plant Pathology

Dr. B. O. Dodge, 8:50 p.m. to 9:45 p.m.

Winter Session

Monday evenings, January 9 to April 3 inclusive, but excluding March 13.

Plant Breeding

Dr. A. B. Stout, 7:45 p.m. to 8:40 p.m.

Economic Botany

Mr. G. L. Wittrock, 8:50 p.m. to 9:45 p.m.

Lecture Course in Practical Gardening

The classes will be held evenings in the Museum Building, beginning September 29. Lectures will begin promptly. Application for admission to the course may be made any time prior to the beginning of the session or on the opening night between 7 and 7:40 p.m. A fee of ten dollars per subject is charged.

Fall Session

Thursday evenings, September 29 to December 22 inclusive, but excluding November 24.

Cultivation of Trees and Shrubs

Mr. J. G. Esson, 7:45 p.m. to 8:45 p.m.

Winter Session

Thursday evenings, January 5 to March 30 inclusive, but excluding March 16.

Greenhouse Practice

Mr. Joseph Tansey, 7:45 p.m. to 8:45 p.m.

Lectures For the Autumn Months

The free lectures given each Saturday afternoon in the Museum Building will be resumed September 10. They will each start at 3 p.m. and will last one hour. Literature pertaining to the subject of the lecture will be on display in the library each week. Publications of the Garden, particularly those which contain material dealing with the topic of the day, will be placed on sale at the information desk at the rear of the lecture hall.

The schedule of the autumn lectures follows:

Sept. 10—EXHIBITING AND JUDGING OF FLOWERS
ETHEL A. S. PECKHAM, Honorary Curator

Sept. 17—MUSHROOMS OF THE AUTUMN WOODS
WILLIAM S. THOMAS, Author of Mushroom Book

Sept. 24—AUTUMN FLOWERS AROUND NEW YORK
E. J. ALEXANDER, Assistant Curator

Oct. 1—ROCK GARDEN CONSTRUCTION
A. C. PFANDER, Assistant Superintendent

Oct. 8—HUMORING THE GARDEN SOIL
T. H. EVERETT, Horticulturist

Oct. 15—BOTANISTS AND HUMAN PROGRESS
J. H. BARNHART, Bibliographer

Oct. 22—WINTER IN OAXACA
W. H. CAMP, Assistant Curator

Oct. 29—GARDEN WORK WITH SHRUBS
P. M. KOSTER, Nurseryman

Nov. 5—SOME IMPORTANT DRUG PLANTS
PROF. WM. J. BONISTEEL, Fordham University

Nov. 12 ALPINE FLOWERS OF CENTRAL GREECE
PROF. CLARENCE H. YOUNG, Columbia University, and MRS. YOUNG

Nov. 19—ORIGIN AND IMPROVEMENT OF PLANTS
A. B. STOUT, Curator of Education and Laboratories

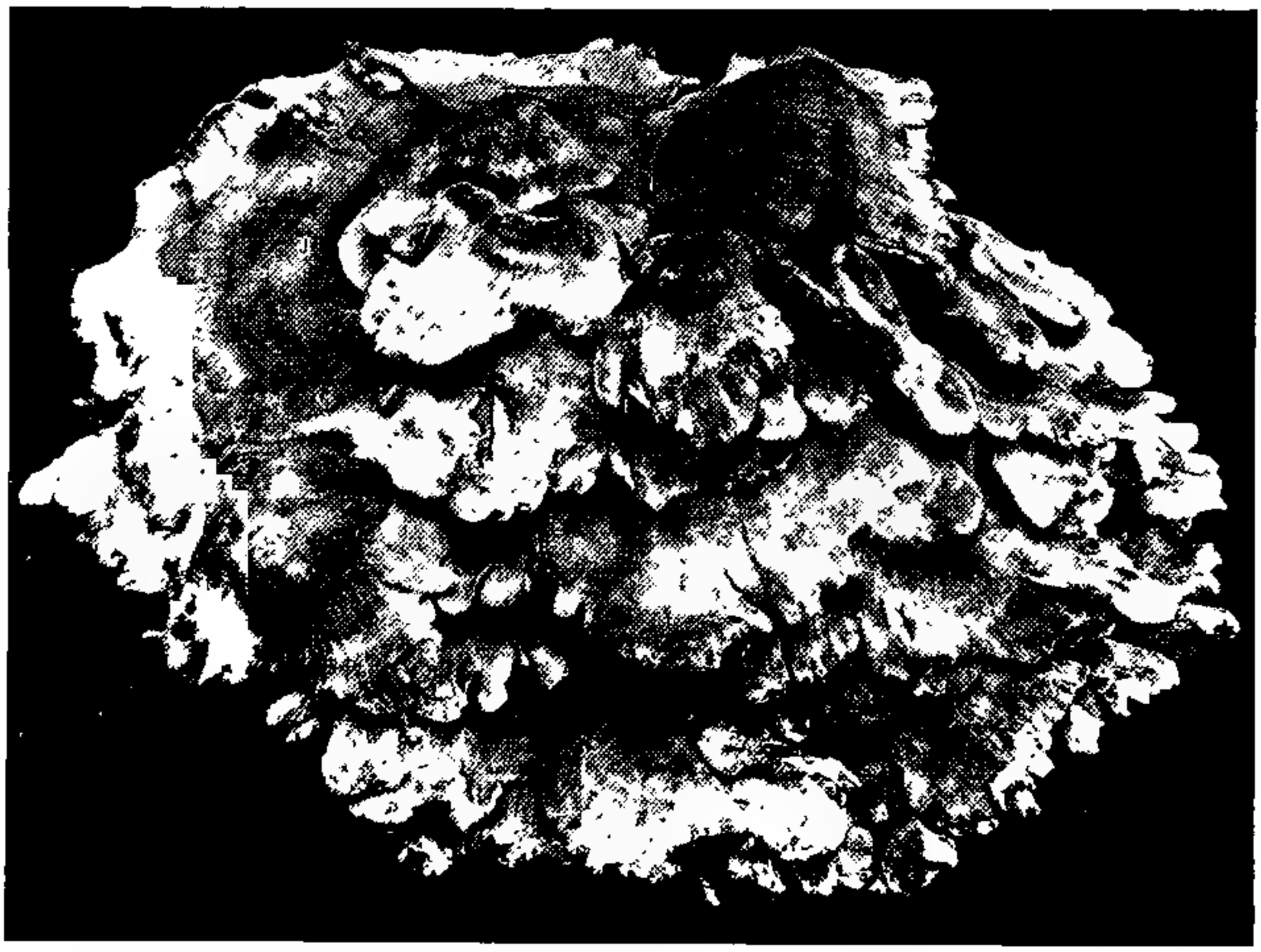
Nov. 26—THE ROMANCE OF PLANT NAMES
H. A. GLEASON, Head Curator and Assistant Director

A Gigantic Mushroom

By F. J. Seaver

RECENTLY there was brought to the Mycological Herbarium for identification a specimen of *Polyporus giganteus* which, so far as our observations are concerned, was a record for size. It was obtained on Staten Island by two Italian boys who collected it purely out of curiosity.

This grayish fungus produces its fruiting bodies in a dense clump, all springing from a single base. In this instance the clump was nearly 3 feet in diameter and weighed 36 pounds.



A single specimen of Polyporus giganteus weighing 36 pounds.

While the mushroom belongs to the pore-producing group of fungi, which are usually avoided because of their toughness, some of them being hard and woody, this particular one is edible. McIlvaine, the old authority on mycophagy, states: "When young and fresh it stews to a pleasant, edible consistency, but is tough if not well cooked or too old. The flavor of a gravy from it is at all times good."

The photograph and figures on diameter and weight were referred to Dr. L. O. Overholts of Pennsylvania State College, who is the leading authority on this group, and he reports that it must be close to an all-time record for this species.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

What is Ecology?

PLANT ECOLOGY. J. E. Weaver and F. E. Clements. 2nd edition. 601 pages, illustrated with 271 figures and colored map. Indexed. McGraw-Hill, New York, 1938. $5.

The high priests of Ecology can be counted on the fingers of one hand, and among them would certainly be the authors of the present volume. Why, then, raise the query as to the content and scope of a science, or is it merely an art, as old as Theophrastus? Their book should be the answer, and it will be to those who do not know that Ecology is a two-headed monster at which many have tilted.

More years ago than one cares to recall, a similar request came to review a very different book by Professor Cowles, now nearly the Archbishop of Ecology. This has since become a classic just as the present volume will certainly be. But they are poles apart, and illustrate better than a wilderness of discussion the wonderment of the public, and especially the garden public as to "What is Ecology?"

It is perhaps a little odd that nowhere in the present volume is Ecology defined, nor does the word occur in the index. Plant geography also lacks definition or mention in the index. The book, then, is apparently meant for those who know that Ecology is still the two-headed monster of old.

The authors have produced a standard text-book on *physiographic* ecology and no one should be astonished at this for they have been the leading exponents of this method of plant research. That they should have all but ignored *physiological* ecology merely illustrates what Professor Cowles said twenty-five years ago, when he did exactly the reverse: "Ecologists are not agreed even as to fundamental principles and motives, indeed no one, least of all the present speaker, is prepared to define or delimit Ecology."

That science, reduced to its bare essentials, comprises the relationship of plants to their environment. Response to that environment is first of all the *physiological* adjustment that the individual plant and its organs must make to survive. When enough of them have made it we get groups of plants growing together—a plant society very much like human society—with vague beginnings, dominance or senescence, and the final mastery of the fit. These ultimate groupings of plants, upon a great scale, make up the vegetation of the earth—a science properly known as phytogeography. Much of the new book is pure plant geography and the colored vegetation map of North America would be just as appropriate, and in fact has been so used, in a text-book entitled "Phytogeography of North America."

Within the limits of plant ecology, as treated by Messrs. Weaver and Clements, it would be difficult and probably impossible to find a more noteworthy text. No student can do without it, and garden enthusiasts, who have written a good deal lately on what they think is ecology, should make it required reading. For here, in far greater detail than can even be mentioned in a brief review, one finds the fundamental principles that control plant societies. There is perhaps no other phase of plant research so important nor so practical to the gardener. Upon it the growth of all plants depends, and the authors are to be congratulated upon the production of so lucid and comprehensive a book upon a difficult subject. That they did not choose to stress *physiological* ecology in no way detracts from what they have done so well. But it still gives some of the initiated and most of the public the right to ask: "What is Ecology?"

NORMAN TAYLOR.

Phytohormones—A New Field

PHYTOHORMONES. F. W. Went and Kenneth V. Thimann. 294 pages, illustrated, indexed. Macmillan, New York, 1937. $4.

This text is an extensive summary and discussion of a relatively new and most interesting field. The authors trace the history of the development of the hor-

mone concept and discuss the technique of auxin determinations, the formation and occurrence of auxins, the relation between auxins and growth, the chemistry of auxins and mechanism of their action, auxin and the growth of roots and the relation of auxins to various tropisms, the formation of roots, inhibition of buds, to cell division, cambial growth, swellings and other phenomena. A bibliography of about 600 references is included. Not all familiar with the subject will agree with the authors' tendency to minimize the contributions of Boysen-Jensen; some will claim that the book overemphasizes the role of the auxins in certain of the phenomena discussed. Nevertheless, it is a valuable and stimulating contribution by men qualified to speak by their own research in the field.

W. J. ROBBINS.

Cell Study for the Experienced

RECENT ADVANCES IN CYTOLOGY. C D. Darlington. 2nd edition. 671 pages, illustrated with 160 text figures and 81 tables. Glossary, bibliography, index. Blakiston, Philadelphia, 1937. $6.

The second edition of Darlington's "Recent Advances in Cytology" is more consistently organized and easier to read than the first edition, although it is still not the book to take along for vacation reading or to recommend to a beginning student of cytology. The book presents Darlington's answer to the question of why things happen in the nucleus as they do and ignores all cytoplasmic constituents except the centrosome. Mitosis, with its constancies and variations in chromosomes, and meiosis in diploids, polyploids, and various hybrids are described as simply as is consistent with the complexity of the processes and without emphasis on divergent views. The role of the chromosomes in the mechanics and physiology of heredity is related to problems of origin and differentiation of species in a way that makes hybridization seem a logical origin for a relatively large group of plants and animals. The modifications and deletions of steps in mitosis and meiosis occurring occasionally or characteristically are made to strengthen the general thesis of chromosomal importance rather than to detract from it. In the chapter on cell mechanics, Darlington applies some of the concepts of chemistry and physics to the problems of nuclear behavior; and spiral molecules, pH's, isoelectric points, liqui crystals, dielectric constants, attraction repulsions, tortions, electrostatics, an magnetics mingle with the centrosome centromeres, chromosomes, chromatid and spindles in an impressive array. Th mechanical system deduced to account fo the duplication and distribution of chro mosomes seems rather plausible, but clos analysis suggests that it still leans heavil on phenomena that could occur only i the intricacies of a vital system. The oc curence of repelling centrosomes at oppo site ends of a liquid crystal which pre sumably they orientated seems almos incredible.

Personally, I liked the summary o observations in tables, the extensive bibli ography, the evolutionary organization o the subject matter, and the use of unify ing concepts and assumptions. I dislike the almost complete omission of conflict ing interpretations, the use of unlabele photographs and of figures and table without text references, the unnecessarily complicated sentences, and the assumptio that, in the present state of our knowl edge, deductions should take precedenc over observations, even though I consider many observations less reliable than Mr Darlington does. I was disappointed no to find any discussion of recent advance in technique or of observations on living material. I would recommend the book to anyone working in or contemplating working in cytogenetics, or to one needing to review recent developments i nuclear cytology.

V. KAVANAGH.

Plants and Their Life Span

THE LONGEVITY OF PLANTS Dr. Hans Molisch. Authorized Englis edition by Edmund H. Fulling. 22 pages, illustrations, tables, bibliography index. Published by the translator New York. 1938. $3.

At last—an English presentation of the works of Hans Molisch on *Die Lebensdauer der Pflanzen.* The subject of longevity of living organisms is one of the important biological problems and Molisch has presented the most comprehensive consideration of the subject from the botanical point of view. Many zoologists have worked on this problem and an excellent summary is given by Korschelt in his well known volumes on *Regeneration* and *Transplantation.* We have now a companion text which is more generally available since it is in

English, thanks to the translator, Edmund H. Fulling.

Perhaps the most outstanding contribution of the entire book is that scattered information, which for the most part is in inaccessible places, has been brought together. The discussion concerns the entire plant kingdom ranging from the unicellular forms to the largest and oldest of the multicellular plants.

The first part of the book will probably not hold the interest of the reader much because it consists of a long list of plants and their estimated ages based upon different authorities. It is arranged according to the great orders and families and is excellent for references to one interested in certain species. Tables in which the maximum ages of various plants have been summarized are useful. Illustrations are good but not very frequent.

Several chapters follow on the longevity of various organs of the plant and also on different tissues. The remainder of the text is devoted to more fundamental considerations of the problems of old age, death and rejuvenescence. Theories of leading biologists are presented and critically reviewed, and Molisch adds some of his own interpretations. Old age, and finally death itself, are attributed in large measure to chemical processes. A very interesting discussion is presented on whether or not a tree is endowed with perpetual life, and whether or not continued asexual propagation by means of cuttings brings about weaknesses of old age.

A good bibliography is to be found, and the translator has made this part still more useful by extending it to include the more recent experimental works. For those interested in the problems of senescence, rejuvenation, and associated phenomena, this translation fulfills a great need which has generally been neglected by botanical writers.

ERNST E. NAYLOR,
Assistant Professor of Botany,
University of Missouri.

Of Herbaceous Plants And Their Use

HERBACEOUS BORDERS. Richard Sudell. 297 pages, indexed; 257 illustrations. Scribner, New York, 1938. $3.75.

Mr. Sudell's Herbaceous Borders has in its favor excellent photography, commendable planting plans, and well organized subject-matter. On the other hand, negligence is frequent in his lists of herbaceous flowers. For example, the North American *Dicentra eximia* is bracketed as synonymous with the Asiatic species, *D. formosa;* the oriental poppy is the only name mentioned under *Papaver;* and *Geranium* seems to be confused with the genus *Pelargonium.* Species and varieties are often dealt with incompletely or under trade names not always acceptable according to international rules of botanical nomenclature.

Notwithstanding this evident carelessness in regard to detail, Mr. Sudell has assembled helpful suggestions concerning the arrangement of herbaceous borders and the planning of gardens for a collection of plants of one genus. He also provides some valuable notes on water-loving materials and their uses. A list of North American natives compiled by Henry E. Downer is included. There are also plant selections for various purposes and an alphabetical list of herbaceous flowers.

The chapter on cultivation contains considerable information on soil preparation and the planting and after-care of herbaceous material, special emphasis being placed on staking—an art which is sadly neglected in this country. That part of the book is therefore especially worth while for American readers.

Herbaceous plant material employed to its best advantage is uncommon in the United States. It is regrettable that we can not confidently turn to Mr. Sudell for reliable information as to plants, for his gardening principles are based upon the best traditions of England, and we can learn much, fundamentally, if we heed his sound working advice.

HOWARD W. SWIFT.

England's Wild Flowers

EVERYMAN'S WILD FLOWERS AND TREES. Miles Hadfield. 184 pages, illustrated with drawings and colored plates; indexed. Dutton, New York, 1938. $2.

Any traveler who has wandered over England's hills trying to identify the unfamiliar wild flowers with any of the less expensive handbooks of the British flora which he can pick up at Foyle's or Meggs' will welcome Mr. Hadfield's compact little book. The descriptions are not detailed enough to enable a botanist to distinguish one species from another

in the same genus, for practically no attention is paid to the number or arrangement of floral parts; but, accompanied as most of them are by pictures of the flowers, they will serve the beginner in learning the identity of the plants most commonly seen. The line drawings, which the author himself has contributed, are far more clear than the colored plates, which have been adapted from Sowerby's British Wild Flowers.

The explanations of the meanings of the botanical names are a commendable feature of the book, and its size and clear attractive type make it convenient for field use.

CAROL H. WOODWARD.

A London Gardener Collects Plants

PLANTS FOR THE CONNOISSEUR. Thomas Hay. 180 pages, illustrated with photographs by Roy Hay, indexed. Macmillan, New York, 1938. $3.

Characteristic of Mr. Thomas Hay was an incident which occurred at the Chelsea Flower Show this year. Though the meeting was accidental and I had not seen him for about four years he no sooner greeted me than he said abruptly, "You are just the man I wanted to see! I want you to get some seeds of Arctomecon for me."

It is by making and maintaining such contacts with people in parts of the world remote from London that the genial Superintendent of London's Royal Parks has succeeded in gathering from distant places numerous rare and useful plants, many of which have since proved their value in gardens.

Mr. Hay is a collector, as well, of rare old books on gardening and botany and when in one of these he finds mention of a worthy plant unknown today in cultivation he exerts every effort to bring about its introduction. Such work necessitates considerable correspondence and effort but pays high dividends in satisfaction in which all who garden may share.

Having a catholic interest in all kinds of plants, Mr. Hay represents a type of gardener all too uncommon in Europe as in America. Although this is his first book, he has for many years contributed notes of value to the horticultural press, and indeed the present volume includes a number of his published articles. It shows great restraint in a man of M Hay's years and experience not to ha previously put into book form his uniq knowledge of plants. Horticultural liter ture would benefit considerably if mo writers followed his example.

"Plants for the Connoisseur" com prises ninety-six brief articles reflecti Mr. Hay's omivorous concern for wort while plants of many types. Each artic ordinarily brings together a descriptic historical notes and other interesting a useful information concerning a sing species, but some deal with more th one species, and most of them are illu trated with excellent photographs by t author's son. While not all of these plan can be successfully cultivated at Ne York, probably all can be well grov in some part of the United States. T new volume is a book for the lover rare plants and should stimulate intere in these and perhaps induce others follow Mr. Hay's example in searchi out the unusual.

T. H. EVERETT.

Dahlia Growing and Exhibiting

MODERN DAHLIAS. J. Lou Roberts. 211 pages, illustrated w drawings, indexed. Doubleday, Dora New York, 1938. $2.

With the ever-increasing interest of larger number of gardeners each year dahlias, a new book "Modern Dahlia by J. Louis Roberts is opportune. Havi grown dahlias himself for a number years, he recognizes the needs of the ne enthusiast as well as of the grower several years' experience, and very ab explains to each the full process of pr ducing satisfactory blooms for garden a home decoration, as well as prize-winne at the flower shows.

Many gardeners do not have mu choice of location for their dahlia plan ing and he reassures them by explaini that good dahlias may be grown almo anywhere with proper preparation of t soil, careful attention to cultivation a feeding, preventive and prompt treatme for diseases and pests (of which the seems to be an increase each year!), a selection of varieties for the purposes d sired. No lists of varieties for gard use or exhibition are given, as these li quickly become obsolete with the intr duction of new varieties each year, b the would-be grower is advised to vi the autumn flower shows and growe

gardens during the season and make his selections with full knowledge of their behavior. The list of types at the end of the book is the "last word" in classifications of the American Dahlia Society and should be well studied, particularly by exhibitors at flower shows. The chapter on fertilizing covers the subject very thoroughly from applications to the soil before planting through special feeding to produce large, good blooms for the show. A few years ago there were not many insects and diseases to trouble the dahlia, but a knowledge of what these are today and the means of combatting them makes for much greater success; the writer has covered this part of his subject exhaustively. He has found that if he protects his plants from insects for the first sixty to seventy-five days, they will have attained a growth that should carry them through to the end of the season. He gives a detailed analysis of the various insects and diseases the dahlia is subject to and prescribes the remedy for each.

Propagation, planting, culture in garden and under cloth houses, and storage over winter are covered in such detail that the veriest novice can understand and the experienced grower can appreciate.

Most helpful to those interested in exhibiting their blooms are Chapters 16 and 17 which treat very fully every step in "Growing for the Exhibition Table" and "Exhibiting." Many can grow good blooms and then find that they lack knowledge of which are the best to select for exhibiting, when to cut them, how to treat them so they will still be in good condition when the judges and the visitors see them, and how to set them up to make the best impression on the judges. All these points are well set forth and should bear fruit in much better exhibits by some old as well as by new exhibitors at our shows this fall.

MRS. H. D. THOMAS,
Paterson, N. J.

Current Literature At a Glance*

By Carol H. Woodward

Root Growth. In a paper on "Growth of Excised Roots of the Tomato," in the June number of the *Botanical Gazette*, Dr. William J. Robbins and Dr. Mary Bartley Schmidt conclude that a medium composed of pure cane sugar, mineral solution, and vitamin B_1 (or thiazole) is adequate for unlimited growth of excised tomato roots. The vitamin is effective at very great dilution—1 part in 40,000,000,000,000 gives a visible effect.

Famous Trees. In Miscellaneous Publication No. 295 of the United States Department of Agriculture, famous trees associated with noted persons, events or places, and trees which are known for their size or age or freakishness are described. The publication, which contains 115 pages, including a bibliography, is available from the Superintendent of Documents in Washington for 15 cents.

Landscape Architecture. One of the many interesting features in *Landscape Architecture* for July is a collection of photographs from the 1938 League Exhibit, showing the finest of work in parks, on estates, around housing projects, and in private gardens in many parts of North America.

Small Bulbs. *Breeze Hill News* for August is devoted to scillas and grape hyacinths. Three dozen species and varieties of scilla received from Holland are described and many of them illustrated with photographs. Half as many species and varieties of grape hyacinths are similarly described.

Astilbe. A recent issue of the *Lexington Leaflets* is devoted to *Astilbe,* a plant too little seen in America. A decorative border plant resembling the spireas, it is easy to grow, easy to divide and transplant, easy to raise from seed, and free from common pests. Stephen F. Hamblin the author, lists a score of good varieties in his leaflet.

Lumber. A brief account of the work and aims of the Forest Products Laboratory of the United States Department of Agriculture is given in the Government's Miscellaneous Publication No. 306. The purpose of this unit is to investigate wood and wood products and their adaptation to different fields of use.

Vegetables. Okra is mentioned as having had a "polite but not enthusiastic reception at a dinner of the Wine and Food Society" in an article on unusual

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

vegetables by André L. Simon in the June *Journal of the Royal Horticultural Society*. The author introduces pumpkins to his British audience, and while he speaks of pumpkin pie, his greatest regret is that pumpkin soup is not better appreciated in England!

Tree Maps. In an oversized volume (Miscellaneous Publication No. 287), E. N. Munns of the U. S. D. A. gives maps showing the distribution of 170 species of forest trees of the United States. The book is available for 35 cents from the Superintendent of Documents, Washington, D. C.

Bronx Park Spring. In a posthumous book by James Reuel Smith, printed for the New York Historical Society, a spring which is described as "one of the loveliest in the city" is said to have once existed on the grounds of the Botanical Garden. It was located 100 feet east of the railroad tracks and 700 feet north of the New York Central station there. A drinking fountain now occupies a nearby site, but it is piped from the City's water supply, the original spring having been diverted into a culvert.

"It is at about East 201st Street, or Suburban Street, or perhaps near the projected Mosholu Parkway South, and at the end of a strip of land devoted by the Botanical department to the growing of young trees," the description reads. "The water boils and gushes up from under a stone and through a gravelly bottom. It is very cold and has a pleasant taste, and is used by all of the workmen in preference to any of the neighboring springs in the park. It has a copious overflow which runs through a cattail marsh in the Botanical Gardens. It is surrounded by some clumps of red clover and wild flowers that make it as attractive as some of the near-by spots that are painstakingly planted with carefully-cultivated blossoms." The book, "Springs and Wells in Manhattan and the Bronx," is illustrated with 54 photographs taken by the author between 1897 and 1901.

New Editor. *The Flower Grower*, of which Leonard Barron had been editor from 1936 until his death last April 9, is continuing publication under the editorship of Paul F. Frese, who comes to New York from *Better Homes and Gardens* in Des Moines.

New Jersey Soil. The newly issued s ond edition of *Save New Jersey S* published by the State Soil Conservati Committee at New Brunswick, N. tells graphically what happens wh rains, floods, and winds attack the la and gives an equally clear picture of wl can be done to keep the soil from was ing and blowing away. Photographs seriously eroded areas are followed w pictures of land with good forest cov with hay, pasture, small grain, and gre manure crops, of grassed waterways natural depressions, deep mulches a cover crops in orchards, and of conto farming and mechanical methods of pr venting soil erosion. The earth wash away 19 times as fast on a hill whe corn was planted up and down the slo as where, on the same slope, it w planted across, the bulletin says.

Forest Retreat. A rather unusual boo let of 32 pages has appeared, written Otto A. Rothert and called "Forest R treat and its Garden." In the backwoo of Muhlenberg County, five miles sou of Greenville, Kentucky, and fifty mil from his home in Louisville, Mr. Rothe has turned the heart of a 2,000-acre tr ber tract into a five-acre garden. Wh he has many evergreens, herbaceous pe ennials, and a well-built rock garden, l greatest interest is in plants with var gated foliage, of which he has collect 125 varieties. He is desirous of acquiri new and rare types of variegated plants

Native. *Cucurbita moschata* proves be a native American food plant, accor ing to Paul A. Vestal in the *Botanic Museum Leaflets* of Harvard Universi A carbonized peduncle which was de nitely identified as this species was fou in some Guatemalan ruins dating fro 900 A.D.

Black Poplars. G. S. Cansdale is t principal author of a monograph entitl "The Black Poplars and their Hybri Cultivated in Britain" which has be published by the Imperial Forestry I stitute of the University of Oxford. T work has appeared preliminary to a stu of poplar canker by species in Gre Britain. Significant minute vegetati characters are described and keyed a attention is drawn to the different lea types on the long and short shoots each tree.

Herbertia. The appearance of the yearbook of the American Amaryllis Society, edited by Dr. Hamilton P. Traub of Orlando, Florida, is always an event to be heralded by every serious grower of plants belonging in this family. Narcissus, Hemerocallis, Nerine, Leucocoryne, Crinum, Alstroemeria, Zephyranthes, and Hippeastrum are some of the many genera which are treated in this number. The 1937 volume (No. 4) is dedicated to the memory of William Herbert, who published his "Amaryllidaceae" just a century ago. The volume contains, besides a biography of Herbert by Arthington Worsley of the Isle of Wight, England, a reprint of an essay of Herbert's on plant breeding and a paper on the place of Herbert in the history of science written by C. D. Darlington of the John Innes Horticultural Institution. An introduction to the book has been written by Sir Arthur W. Hill, Director of the Royal Botanic Gardens at Kew. The subjects in the book include descriptions and phylogeny of the amaryllids; cytology, genetics, and breeding; physiology of reproduction; culture, and notes on the society's progress, which in so short a period of time can be said to be outstanding.

Shrubs in Flushing. The 1938 *Garden Bulletin* of the Flushing Garden Club on Long Island contains a list of about 200 shrubs which are in local cultivation. Mrs. E. P. Martin, who compiled the list, has given the botanical and the common or varietal name of each and its exact location in Flushing.

Chile. "Endemic Plants of Chile" is the translated title of a recently acquired book which gives descriptions, distributions, and uses, as well as illustrations of a large number of Chilean plants. Otto Urban is the author.

Microscopes. The presidential address of Reginald S. Clay of the Royal Microscopic Society, published in the March issue of the Society's Journal, reveals the marvels of modern technique in high-powered magnification. The article, which is entitled "A Review of the Mechanical Improvements of Microscopes in the Last Forty Years" is abundantly illustrated with technical drawings. One of the improvements which the author considers important is a cylindrical lens-cap which may be applied on a microscope being used by a person afflicted with astigmatism.

Germination. What is called "A Rapid Method of Determining the Viability of Dormant Seeds" is given by Florence Flemion in the April-June *Contributions from the Boyce Thompson Institute.* Witch-hazel seeds from two different crops, besides seeds of four members of the Rose family, and four of the Pine family, were tested on moist filter paper in petri dishes at room temperature. Their viability was proved in from five to ten days by observing the behavior of the excised embryos. The results agreed with actual germination tests in cultivation.

Mycorrhiza. A note in *Nature* for July 9 states that M. A. Mostafa has shown that well known garden plants such as *Tropaeolum majus, Phlox Drummondii, Verbena officinalis,* and *Clerodendron inerme* show well developed endotrophic mycorrhiza when growing in a soil which is alkaline and of a low humus content.

Fossil Pollen. The beginning of a study of the fossil pollens in New Zealand has been made by Lucy M. Cramwell of the Auckland Museum. A preliminary report subtitled "The Key to the Vegetation of the Past," is published in the *New Zealand Journal of Science and Technology,* from which a reprint has been received.

North American Flora. Part 2 of Volume 29 of *North American Flora* contains a treatment of the Apocynaceae by Robert Everard Woodson, Jr.

Coffee. In the latest of the Botany Leaflets (No. 22) from the Field Museum, coffee is treated popularly from the point of view of its history, culture, and preparation for commercial use.

Pseudotsuga. A revision of the genus *Pseudotsuga* is given by Mlle. F. Flous in Nos. 1 and 2 of the *Bulletin de la Société d'Histoire Naturelle de Toulouse,* 1937. The same author treats the genus *Tsuga* in the following two numbers of that year.

Black Rock Forest. Botanical studies in the Black Rock Forest of New York State comprise the seventh bulletin on this area and the third on silvicultural research. Hugh M. Raup, the author, has taken the ecological point of view with the object of stimulating further research. The bulletin of 161 pages is published at Cornwall-on-Hudson. At the end a list of lichens is given by Lucy C. Raup.

Genes. In the *Quarterly Review of Biology* for June, Addison Gulick of the University of Missouri concludes a highly technical paper entitled "What Are the Genes?" In the first instalment he gave the genetic and evolutionary picture; in the second, the physio-chemical picture.

Citrus Fruits. Japan and India, and perhaps New Zealand too, may soon be rivals of the United States in the production of citrus fruits, if one can judge by recent publications from these countries, which have virtually flooded the Botanical Garden's library. Professor Tyôzaburô Tanaka is the author of a large number of works dealing with citrus culture in both Japan and India. He points to India as the original home of the majority of species of citrus fruits, and speaks with high hopes for the future of what he calls new "species" to be developed in Japan. The New Zealand *Journal of Agriculture* devotes a special section to citrus culture.

Notes, News, and Comment

Old Books. When the New York Society Library, which is one of the oldest library organizations in New York City, recently moved its headquarters from University Place to 53 East 79th Street, it offered at private sale, particularly to other libraries in and near New York, some of the many books it had accumulated outside its present scope. The New York Botanical Garden thus acquired four hundred volumes, some of which represent early American botanical and horticultural periodicals which had been lacking in our collections. While a large number of the volumes will find an appropriate place on our shelves, others will be used for the development of the library by exchange.

Ecology. At a conference on plant and animal communities arranged by the Biological Laboratory of the Long Island Biological Association at Cold Spring Harbor, August 29 to September 2, Dr. H. A. Gleason gave a paper entitled "The Individualistic Concept of the Association." The conference was arranged by Stanley A. Cain, Secretary, who has spent considerable time at The New York Botanical Garden this past summer.

Summer Visitors. A. J. Sharp, assistant professor of botany at the University of Tennessee, worked for a month on a scholarship last summer at the Garden studying the mosses south of the United States—in Mexico, Central Amer South America, and the West Indies.

Dr. J. P. Carabia, a student at Agricultural Experiment Station Havana, Cuba, has come to the Un States for the winter months. While ing some taxonomic work at the Univ sity of Pennsylvania, he will supplem his studies by spending part of his t at The New York Botanical Garc where the herbarium is particularly r in specimens of the Cuban flora, posited from the early collections of B ton, Wilson, and others. In addition, Carabia is investigating succulents, b meliads, and orchids of the world.

Carlos Muñoz, engineer agronomist the University of Chile at Santiago, sp several days at the Botanical Garden last of August before going to Harv where he will work for a year with E. D. Merrill on the plants of Chile. is visiting this country on a Guggenh fellowship.

Chris G. Schmitt, University of M souri graduate student, has been do research on smuts at the New Y Botanical Garden, in preparation for Ph.D. thesis.

Dr. Walter F. Loehwing, professor botany at the University of Iowa, visi the Garden August 30 in search of formation to aid in the establishment a new botanical garden at Iowa City.

Dr. Henry S. Connard of Grinr Iowa, spent August 28 at The New Y Botanical Garden studying South Am can waterlilies.

Among other late summer visitors w H. S. Redgrove of London, Mrs. R grove, secretary to the editor of *Gardeners' Chronicle*, and Violet Venab also of London; Henry Teuscher, sup intendent and chief horticulturist of Montreal Botanic Garden; Dr. Lulu Gaiser of McMaster University, Ha ton, Ontario; Raymond Fosberg of University of Pennsylvania; Dr. Rog McVaugh and Dr. S. F. Blake of Bureau of Plant Industry, Washing D. C.; and Gladys Warner of the P Production Service, Winnipeg, Manit

Flower Show. About thirty kinds native wild flowers and fruits are be used in an exhibit by The New Y Botanical Garden at the flower show the Westchester County Horticult Society at the County Center, W Plains, September 14-17. Each variet being labeled with both common scientific name.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

OCTOBER, 1938

RED OAK (*Quercus rubra*), ONE OF THE NATIVE TREES STILL STANDING ALONG RIVERSIDE DRIVE NEAR 180TH ST.
Cover Photograph by Fleda Griffith

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PERIODICALS AND BOOKS

Scientists and laymen alike are served by the publications of The New York Botanical Garden. With *North American Flora,* which eventually will contain a monograph of every plant family of this continent, taxonomists are kept informed of the identification of every known kind of plant of the United States, Mexico, Central America and the adjacent islands, and, on the north, Canada, Alaska and Greenland.

Brittonia, named in honor of the founder and first director of the Garden, contains technical articles on plant identification and descriptions of new species. *Addisonia,* named in honor of Addison Brown, Dr. N. L. Britton's collaborator in preparing the famous Britton & Brown volumes on the flora of North America, gives complete descriptions and full-page colored plates of flowering plants of exceptional interest which have been successfully raised at The New York Botanical Garden or which are native to North America.

Mycologia is the official organ of the Mycological Society of America. Issued every other month, it contains technical material, illustrated, on all forms and phases of the fungi.

The Garden's *Journal,* on the other hand, is meant to be popular, and yet to present in authoritative manner to its readers articles of interest on horticulture and botany, nature study, and kindred subjects, besides a survey of the current activities of the Garden.

"Plants of the Vicinity of New York" by H. A. Gleason is also intended for the people. This convenient volume dealing with flowering plants which grow within 100 miles of New York, is a simple guide to the flowers of woods and fields usable by anyone who can distinguish a petal from a leaf.

While Rydberg's "Flora of the Prairies and Plains of Central North America" is a botanist's handbook, like Britton & Brown's "Illustrated Flora of the Northern United States and Canada", it can be used to advantage by the amateur.

Such works, which are merely representative of the Botanical Garden's productions, are one of the institution's major services to the world of science and to popular education.

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Trees and Shrubs In New York City And Some Observations On Their Growth

By Nelson Miller Wells
Landscape Architect

II.

The Second Zone

THE exact boundaries of the second zone of plant tolerance in New York City are not clearly defined. From the edge of the first zone, where the paramount factors are those which limit the successful growth of plants, the second zone extends throughout the built-up business sections and hotel and residential areas, where tall buildings and pavements are practically continuous.

About the same growing conditions exist here as in the areas defined as the first zone except for the somewhat less intense pollution of the atmosphere. Substructures which ramify in the soil affect the movement of soil waters; topsoil of a quality sufficient to support plant life exists in only meagre quantities; natural rainfall is collected into storm sewers without benefiting the soil; and dense shade is created by the tall buildings.

The plants mentioned as tolerant in the first zone stand a better chance for success in the second, and in addition there are a number of others which will grow here although they vary in the degree of their success.

Among the trees, Norway maples and pin oaks have been considered appropriate and each kind has been quite freely planted over a period of years. The pin oak appears to have been the more successful of the two, although it usually loses its excurrent habit and assumes a stunted appearance. Very likely if they were

tried, the red, scarlet, and shingle oaks would be as good as or better than the pin oaks. Even the Turkey and mossy-cup oaks are reasonably good in Central Park.

Pin oaks, having a fibrous root system, transplant easily, even when they have not been nursery grown. The roots of red oaks are coarse and are seldom kept adequately pruned in nurseries; the trees are therefore more risky to transplant. This difference is undoubtedly one reason for the prevalence of pin oaks and the scarcity of reds, though the heavy, glossy leaves of red oaks stand up well during summer droughts while pin oak leaves frequently appear shriveled.

Other trees which are reasonably thrifty under these conditions include the horse-chestnuts, honey-locusts and mulberries. Hackberries have seeded themselves into strange corners and seem capable of withstanding considerable drought and reflected heat. Perhaps they are resistant also to smoky air. They are usually stunted however and heavily laden with witches' brooms.

Likewise appearing as a natural growth in waste areas and certain parks are frequent examples of the common black cherry. If it were not for the annual crop of tent caterpillars and some of the other nuisance qualities possessed by this tree it might enjoy a reputation as a desirable subject for city conditions, for it has a picturesque habit of growth, the foliage is good, and it will appear happy even when growing on thin dry soil.

The Chinese scholar-tree, though rarely seen, is an excellent tree for this zone. Several specimens have been planted here successfully. Among the lindens, the common, the silver, and the weeping linden appear to be the best, although most of the small-leaved European varieties are also good. They all suffer, however, from summer drought and some species, such as the American linden, lose all their leaves in late summer.

Occasionally an Osage orange has been planted in the city and it is found to be exceptionally thrifty. If this tree were not so uncommon in our eastern market perhaps it would be used more freely. Where the bald cypress has been planted as a street tree in a limited area of Flushing, and also in the few places where it exists in the larger parks, it has endured for many years. These are all such luxuriant trees that the species might be expected to withstand even greater adversities.

Among the small-growing trees and large shrubs there are a number of good representatives. Hawthorn, witch-hazel, mag-

nolia, and cork-trees are about the best, although two of the small maples—the English hedge maple and the Amur maple—as well as the buckthorns and flowering cherries can each be found in this district.

All of the common kinds of hawthorn, such as the Washington and thicket thorns, seem to do well, but the glossy-leaved species are the best. The cockspur thorn belongs to this class, and old plants of Carrière hawthorn, with its large varnished leaves, have endured for many years in a thrifty condition in the Broadway plots in mid-Manhattan. Woolly and green aphids are quite serious pests on the hawthorns, but these plants appear to be reasonably free from diseases.

Magnolias and witch-hazels seem absolutely incongruous in the city but a number of kinds of each are surprisingly successful. Two of the viburnums also are good. One, the native blackhaw, will grow on poor, thin soil and straggle up to a small tree, although in its youthful stage, when fresh from the nursery, its habit is compact and it has fine specimen qualities. Siebold viburnum is another and, like the specimen at City Hall Park, Manhattan, it will reach a height of twelve feet and appear quite thrifty.

Several vines make their appearance in this zone. English ivy is fairly good, especially as a ground-cover. Wisterias will grow several stories high. Matrimony-vines, fleece-vines and the Japanese honeysuckles can each be found on fences, walls and covering the ground. Some of the woodbines are also occasionally found here.

The Third Zone

The third zone of plant tolerance covers a very large portion of the city. It extends from the second zone through the less intensively developed portions of the unrestricted business zones, including the areas of three-story attached and semi-detached houses in residential areas. It has as its outer limits those portions of the city where suburban conditions prevail. In the suburbs, where houses are spaced on at least 60-foot lots, there is a greatly increased amount of undeveloped land; air and moisture conditions are better, and there is an opportunity for almost any kind of planting that will endure the climate.

The line between the second and third zones is quite indefinite. Some of the plants mentioned for the third zone may survive in

zone two, and many from that zone are likely to be a great deal more successful here. It is noteworthy that the largest part of the trees and shrubs which appear for the first time in this list are native to this region. They include the American ash, sassafras, sour-gum, sweet-gum, persimmon, and American larch. From other sources come the Japanese larch, sourwood or sorrel, and the European beech. The ash and sweet-gum make good street trees in this zone, while the others are usually found in parks or as lawn shade trees.

Several additional large shrubs or small-growing trees appear. These include the goldenrain-tree, the hornbeams (both native and European species), cornelian cherry, silverbell, snowbell, hazelnut, and Russian olive.

Among the native shrubs are the chokeberries, cornels, sumacs, various viburnums, and blueberries, and the shadblow, spicebush, winterberry, and summersweet. Also several of the distinctly gardenesque flowering shrubs can be seen, such as Japanese quinces, bush honeysuckles, hydrangeas, forsythias, rose acacias, prairie and rugosa roses, Japanese barberries, and the winged euonymus and its relative, the European burning bush.

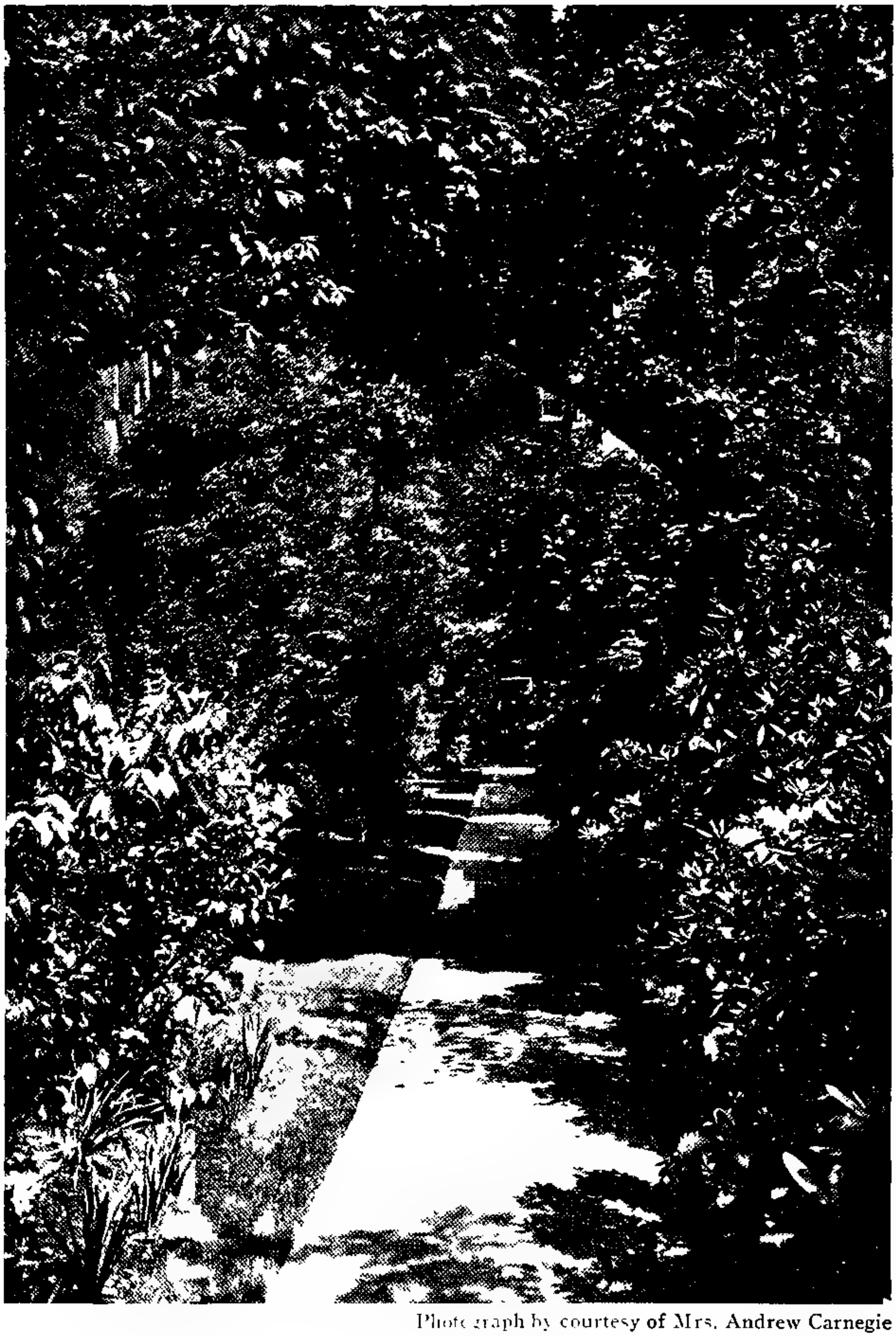
Of course there are numerous other kinds of woody plants to be found within this zone, but the ones mentioned here appear to be the best. Some species seem better than others in the same genus, and where there is a preference only the better kinds are noted in the accompanying lists. The most surprising instance I have discovered is a number of bottlebrush buckeyes in a fairly thrifty state growing in the Broadway plots where they have survived for many years in the heat and dust of that busy thoroughfare.

Notes on Special Plants

Evergreens

We all seem to have a longing to use a certain amount of evergreen material in our plantations. Even though we know they are not going to be entirely successful in the city we cannot resist trying some of them. In general they have to be treated like annuals and replaced as often as they fail. Some kinds, however, will tolerate the city conditions better than the others.

Austrian pine is about the best of the evergreen conifers, although it soon languishes if the air is bad. The yews, particularly



Photograph by courtesy of Mrs. Andrew Carnegie

A city garden like this, in which broad-leaved evergreens are a dominant feature, must be replaced with fresh material every four or five years. The scene is in the private garden of Mrs. Andrew Carnegie, overlooking Central Park from Fifth Avenue, in New York City.

the various forms of Japanese yew, are being used extensively. Some will endure possibly for several years but the best plantations are those which have their sickly plants replaced each year.

Some of the broad-leaved evergreens are standing very well. The hollies are among the best. Even the native American holly is occasionally seen. The native inkberry and different forms of Japanese holly are especially good. Firethorns are equally successful. Where the cultural conditions are favorable a variety of evergreen rhododendrons together with andromedas, leucothoës, and such azaleas as *amoena* and *indica* types do surprisingly well.

Evergreen ground-covers like periwinkle, Japanese spurge and evergreen bittersweet are not generally dependable.

Plants that are Not Successful

Some plants seen around the city are invariably in a weakened and sickly condition. Such kinds should always be avoided where atmospheric conditions are unfavorable.

Evergreen trees are the most conspicuous failures. Hemlock, spruce, fir, Douglas fir, and pine are the normally large-growing kinds used in landscape plantations with dwarf pine, juniper, arborvitae and Japanese cypress for low and intermediate heights. None of these has been observed in the city in anything like a thrifty condition.

Among the deciduous plants that do not appear to be able to survive in New York City are red and sugar maples. Even the sycamore maple does not like the smoky air. American beech, flowering dogwood, the birches, and two of the viburnums, the Japanese snowball and the linden viburnum, and most of the spireas are poor in growth. In places like Prospect Park, Brooklyn, some of these may be seen in a fairly healthy condition but they do not do well in Central Park or in situations where the conditions are more adverse.

Excepting for the evergreen trees the range of plants is quite extensive for city planting. Trial and error afford the surest test. A certain plant may fail in one particular area but thrive exceedingly well in a similar exposure just a few blocks distant.

In the following lists, plants which are most suitable for the second and third zones are named.*

---

* Through an unaccountable oversight, the rose-of-Sharon mentioned last month in the list of plants for the first zone was given the botanical name of the hollyhock instead of its rightful name, *Hibiscus syriacus*.

The Second Zone

English Hedge Maple	*Acer campestre*
Amur Maple	*Acer Ginnala*
Norway Maple	*Acer platanoides*
Horse-chestnut	*Aesculus Hippocastanum*
Hackberry	*Celtis occidentalis*
Carrière Hawthorn	*Crataegus Lavallei*
Thicket Hawthorn	*Crataegus intricata*
Washington Thorn	*Crataegus Phaenopyrum*
Cockspur Thorn	*Crataegus Crus-galli*
Honey-locust	*Gleditsia triacanthos*
English Ivy	*Hedera Helix* and varieties
Witch-hazel	*Hamamelis* spp.
Japanese Honeysuckle	*Lonicera japonica*
Matrimony-vine	*Lycium halimifolium*
Osage Orange	*Maclura pomifera*
Magnolia	*Magnolia* spp.
Mulberry	*Morus* spp.
Cork-tree	*Phellodendron* spp.
Chinese Fleece-vine	*Polygonum Aubertii*
Black Cherry	*Prunus serotina*
Flowering Cherries	*Prunus* spp. and vars.
Turkey Oak	*Quercus Cerris*
Scarlet Oak	*Quercus coccinea*
Shingle Oak	*Quercus imbricaria*
Mossy-cup or Bur Oak	*Quercus macrocarpa*
Pin Oak	*Quercus palustris*
Red Oak	*Quercus rubra*
Buckthorn	*Rhamnus* spp.
Chinese Scholar-tree	*Sophora japonica*
Bald Cypress	*Taxodium distichum*
Small-leaved European Linden	*Tilia cordata*
Weeping Linden	*Tilia petiolaris*
Silver Linden	*Tilia tomentosa*
Common Linden	*Tilia vulgaris*
Blackhaw	*Viburnum prunifolium*
Siebold Viburnum	*Viburnum Sieboldii*
Wisteria	*Wisteria* spp.

The Third Zone

Bottlebrush Buckeye	*Aesculus parviflora*
Shadblow	*Amelanchier* spp.
Red Chokeberry	*Aronia arbutifolia*
Black Chokeberry	*Aronia melanocarpa*
Spicebush	*Benzoin aestivale*
Japanese Barberry	*Berberis Thunbergii*
European Hornbeam	*Carpinus Betulus*
American Hornbeam	*Carpinus caroliniana*
Summersweet	*Clethra alnifolia*
Cornelian Cherry	*Cornus mas*
Gray Dogwood or Cornel	*Cornus paniculata* and similar species
Hazelnut	*Corylus* spp.
Japanese Quince	*Chaenomeles japonica*
Persimmon	*Diospyros virginiana*
Russian Olive or Oleaster	*Elaeagnus angustifolia*
Winged Euonymus	*Euonymus alatus*
European Spindle-tree or Burning Bush	*Euonymus europaeus*

European Beech	*Fagus sylvatica*
Forsythia	*Forsythia* spp.
White Ash	*Fraxinus americana*
Silverbell	*Halesia carolina*
Hydrangea	*Hydrangea* spp. and vars.
Winterberry	*Ilex verticillata*
Goldenrain-tree	*Koelreuteria paniculata*
American Larch	*Larix laricina*
Japanese Larch	*Larix Kaempferi*
Sweet-gum	*Liquidambar Styraciflua*
Bush Honeysuckle	*Lonicera* spp.
Sour-gum	*Nyssa sylvatica*
Sorrel-tree	*Oxydendrum arboreum*
Sumac	*Rhus* spp.
Rose-acacia	*Robinia hispida*
Rugosa Rose	*Rosa rugosa*
Prairie Rose	*Rosa setigera*
Sassafras	*Sassafras variifolium*
Japanese Snowbell	*Styrax japonica*
Blueberry	*Vaccinium* spp.
Withe-rod	*Viburnum cassinoides*
Nanny-berry	*Viburnum Lentago*
Viburnum	*Viburnum molle*

Habitat Hunting In Mountains Of the Southeast With Student Gardeners

By E. J. Alexander

When four of the student gardeners of The New York Botanical Garden chose to spend their vacations this year by making a collecting trip through a portion of the southern Appalachians, they gave themselves the opportunity of seeing in native habitats many plants which they were cultivating at the Botanical Garden. A large proportion of these had been collected on the Garden's Southern Appalachian Expedition of 1933, *while others among the newer ones had been acquired by members of the staff on subsequent independent trips. Some, on the other hand, were species commonly cultivated, but ones which the students had formerly not associated with the wild state. In addition, they observed many plants entirely new to them and brought back seed or living specimens of a number of subjects which may be new to horticulture.*

Part of their usual outside work as student gardeners consists in making herbarium collections of the local flora. To their specimens gathered on previous jaunts in the vicinity of New York, each of them added about 160 *new subjects, all representing plants which do not grow north of central Pennsylvania.*

Thus, while on a vacation trip these four student gardeners -Ralph Pinkus, Samuel Bridge, A. J. Bisaillon, and Donald Samson—became acquainted with an important floral region of the United States, increased their own collections of plants for study and reference, and added nearly a thousand plants of fifty or more herbaceous species, besides a number of woody ones, to the Botanical Garden through their collections of seeds and living material. Their guide on the trip was E. J. Alexander, who took them over much of the region covered five years previously on the Garden's official expedition in search of plants.—C.H.W.

Into the Southern Appalachians

THE shale-barren region along and around the Virginia-West Virginia state line was the first objective on the student gardeners' trip. This area is the home of several interesting and attractive plants, some of which were introduced to cultivation by the Garden's Southern Appalachian Expedition of 1933. Since a few of these plants had presented difficulties in cultivation the students wished to study them in their natural habitats to try and find the conditions necessary for their well-being. The large-flowered *Oenothera argillicola* was not yet in bloom, but many plants were seen in their young stages. The small gray-foliaged ragwort, *Senecio antennariifolius* was past flowering, but its seeds were ripe and it is hoped yet to introduce this plant to rock gardens.

One of the greatest rarities of the region, the little purplish-flowered *Astragalus distortus*, which had proved most unamenable to cultivation, was sought and found in both flower and fruit. Growing as it does in a dry hardpan mixture of shale fragments and their residual clay, it will probably still prove a difficult though desirable subject. *Trifolium virginicum*, the stemless endemic clover of the region, was found also in flower and fruit.

The shale-barren region is not continuous, so we found a different type of habitat to investigate by visiting a partly wooded cliff area adjacent. Here in crevices and on steep slopes were seen the little white-flowered crucifer, *Draba ramosissima*. In loose cushions on the cliff edges were large patches of a sandwort, *Arenaria stricta*, and back among the trees the shooting-star, *Dodecatheon Meadia*, and the pale-pink-flowered *Sedum telephioides*, a rather coarse but attractive plant. The purple-flowered wood-mint, *Blephilia ciliata*, was quite common in this area, making large clumps on open slopes. Nearby we found frequent colonies of *Linum perenne* naturalized along the roadside. So far as we know, this is the first record of this European species in this region.

Near the headwaters of the Potomac river, we came across numerous stands of *Anemone riparia* in open limestone woods. This plant with its handsome, rather large, white flowers would be a worthy denizen of the shaded wild garden if amenable in cultivation. On the mountains east of Monterey, Va., we stopped to look at plants of *Menziesia pilosa*, an ericaceous shrub with

dull yellowish-orange flowers, and in searching through the neighboring woods we found the lily-of-the-valley in full flower. This plant is strangely enigmatical in its occurrence in the European mountains, the southern Alleghenies, and in eastern Asia. It is the only plant known with a natural distribution in the temperate zone of three continents.

In damp hollows nearby were attractive colonies of the filmy-flowered *Heuchera villosa* and the white heads of *Clintonia umbellulata.*

One more shale-barren was visited where, in August and September great drifts of *Eriogonum Alleni* cover the steep unstable slopes with a yellow glow.[1] Here also are colonies of the shrubby *Clematis ovata,* with dull purple nodding bells. The white-flowered *Sedum Nevii*[2] is common throughout the southern Appalachians, but nowhere does it reach better development than in the shale-barren area.

A side trip was made in West Virginia to visit a colony of the rare box-huckleberry, *Gaylussacia brachycera,* each colony of which is said to consist of a single plant. In the same region we found the recently described *Phlox Buckleyi* in full flower, some plants having flowers with laciniate petals. In southwestern Virginia, nearby mountain-slopes and hillside pastures were frequently buried under a pink avalanche of mountain laurel, one of the finest sights of the trip.

Reaching the crystalline Blue Ridge, we began to see more and more frequently the typical southern mountain plants which are either confined to or reach their best development in the higher altitudes. Those which first became plentiful were *Magnolia acuminata, M. Fraseri, Oxydendrum arborcum, Clethra acuminata, Azalea calendulacea, Galax aphylla, Silene virginica*[3] and *Sedum ternatum.* All have been long in cultivation, but it was of great interest to the students to see them in their native stands.

In northwestern North Carolina and northeastern Tennessee, it was of botanical interest to note frequent occurrences of *Hieracium pratense,* which is not listed in the manuals as occurring south of Virginia.

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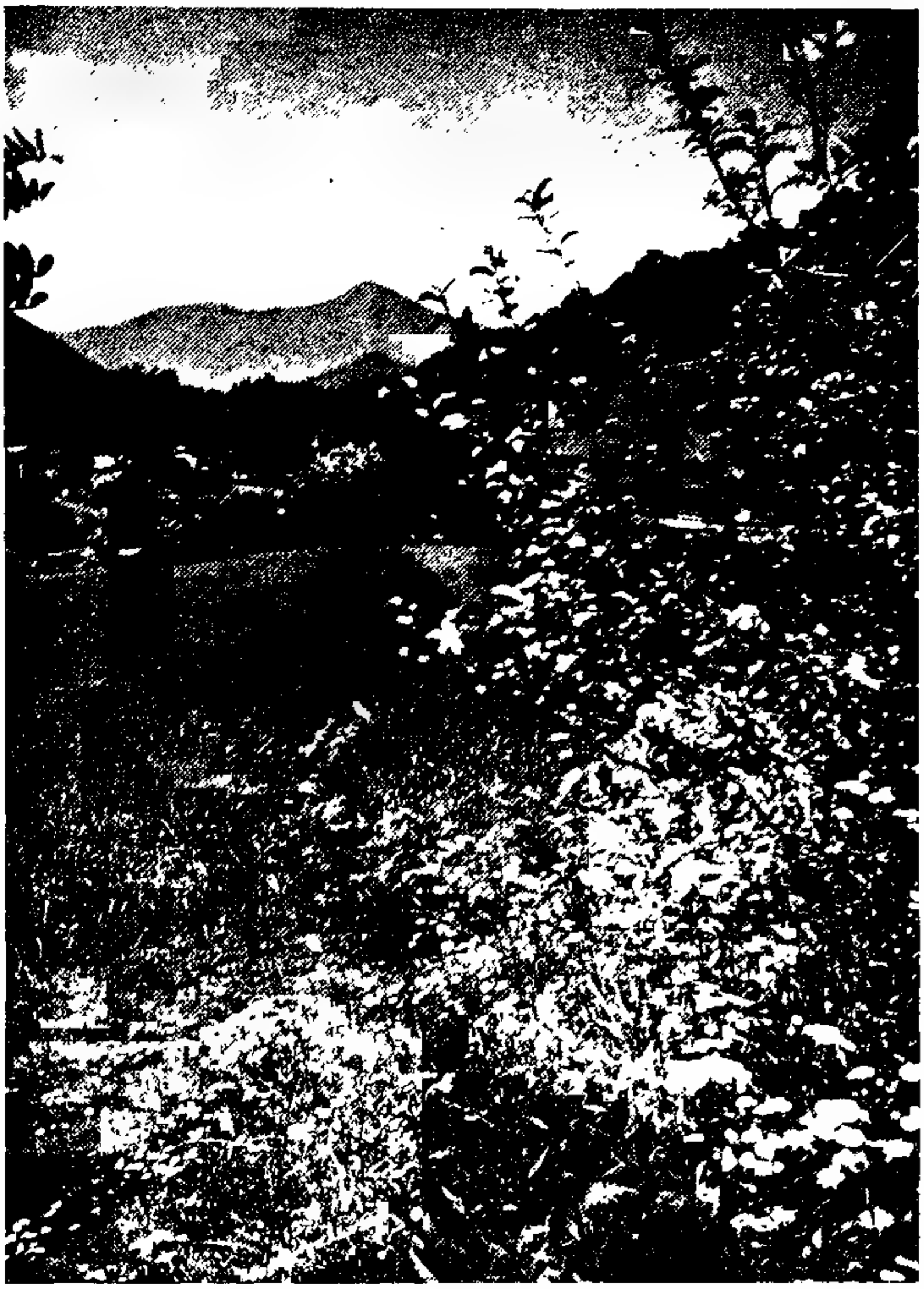
[1] For a description of *Eriogonum Alleni* see *Addisonia* 20: No. 3. 1938.

[2] *Sedum Nevii* is now well established in the Thompson Memorial Rock Garden, where it is making an increasingly splendid show of white bloom every year in late spring.

[3] Though a difficult subject in the north, *Silene virginica* now seems to be holding its own with its fiery blossoms in the Thompson Memorial Rock Garden. For a description, see *Addisonia* 19: No. 2. 1935.



Photograph by A. J. Bisaillon

The upper portion of Mount Pisgah, 5,749 feet in altitude, is a heath-bald in an advanced stage. The middle slopes of this great landmark west of Asheville are covered with a typical southern Appalachian forest. The saxifrage shown on page 238 was photographed on its upper slope.

Traveling on steep grades and long winding and twisting roads, first up one mountain range, then down another and back up still another, as it can only be done in North Carolina, we finally arrived at Asheville, the center of the mountain region. Here we visited Mr. and Mrs. G. L. Clement at the Nik-Nar Nursery, through whose efforts many rare native plants are being brought into cultivation. Accompanied by our friends we visited the

famous swamp at Flat Rock where in its type locality we saw *Sarracenia Jonesii.* Associated together in this same swamp is a curious mixture of coastal, mountain and northern plants. Some of the more prominent among them were *Helenium brevifolium* and *Pogonia divaricata* from the coastal plain; *Amianthium muscaetoxicum* and *Azalea arborsecens,* generally from the mountains; *Myrica Gale* and *Azalea viscosa,* which are distinctly northern species; and *Kalmia carolina* and *Scutellaria integrifolia,* which may be found both in the mountains and along the coast.

On Chimney Rock mountain, the high scenic point of the Hickorynut Gap section, we saw such typically southern Appalachian plants as *Heuchera parviflora, Philadelphus inodorus, P hirsutus, Selaginella Sherwoodii, Rhododendron carolinianum, Tsuga caroliniana, Pinus pungens, Trautvetteria carolinensis, Talinum teretifolium, Phacelia bipinnatifida,* and *Penstemon canescens.* There were of course many other plants, but those named are in exceptionally well-developed natural stands and furnished the best examples for study. In the nearby warm valley region, we saw a fine colony of the hardy native passion-flower, *Passiflora incarnata.*

Mt. Pisgah, a beautifully shaped mountain west of Asheville, has a fine heath-bald development, making it an area especially well worth visiting. In the forests on the middle slopes are great festoons of *Aristolochia macrophylla* and fine thickets of *Azalea calendulacea.* On the upper elevations, *Saxifraga leucanthemifolia* and *Houstonia purpurea* form the great mass of cliff-face plants, the woods around being well supplied with *Hugeria erythrocarpa, Ilex monticola* and *Menziesia pilosa.* On the uppermost areas, *Hypericum Buckleyi* and *Potentilla tridentata* form heavy sods in open stretches, while *Rhododendron carolinianum* and *R. catawbiense* form the heavy thickets just below the summit. On the summit itself is one of the most finely developed stands known of *Pieris floribunda,* where a trail runs for a mile or so through its gnarled, headtopping growth. Off the western slopes we saw handsome colonies of *Phlox carolina* and *Eryngium yuccifolium,* and in the Nantahala Gorge we had a long-drawn-out search for some of the large colonies of the rare sedge, *Cymophyllus Fraseri.* The rocky walls here were also well-decorated with *Dicentra eximia.* Crossing into the Tennessee River valley we saw the only bit of southern lowland flora of the trip, where along the river-

banks were heavy thickets of *Ulmus alata* and *Quercus nigra* and scrambling over them *Vitis rotundifolia, Bignonia crucigera* and *Cocculus carolinus*. Ascending the Great Smokies from the west, we admired the great forests and the thickets of rhododendron and laurel, and on the summit ridge made several side trips into the heavy growth of *Abies Fraseri* and *Picea rubens*. The more interesting things seen were a handsome purple-flowered form of *Hydrophyllum virginianum*, occasional patches of *Claytonia caroliniana* and *Parnassia asarifolia* and quantities of *Solidago glomerata* and that interesting endemic of the Smokies, *Senecio Rugelia*[4]. Back in North Carolina we found along the bank of Alarka creek a nice stand of *Rhododendron minus*. In open thickets along the stream were scattered plants of *Thermopsis caroliniana*, a common enough garden plant, but extremely rare in the wild. Leaving the gorge and climbing over the ridge, we found near the top colonies of the parasitic shrub, *Pyrularia pubera*, its pearlike fruits half-formed. Many splendid specimen plants of *Silene virginica*, the fire-pink, were seen in this section. As we approached Wayah Bald, splendid stands of *Rhododendron maximum* and *Kalmia latifolia* 25-30 feet high were seen, and great colonies of the endemic huckleberry, *Gaylussacia ursina*, mingled with Indian paint-brush, *Castilleja coccinea*, and the bunch-flower, *Melanthium latifolium*, the latter a useful plant for shady woodland planting. On the summit of the mountain, the fine stand of *Azalea arborescens Richardsonii* was just coming into flower, the yellow blotch on its upper petal easily distinguishing it from the species. Near the summit was the finest plant we saw of *Azalea calendulacea*; it measured about 15 feet in diameter and height and was ablaze from top to bottom with bloom. In some of the deep ravines on the lower slopes were frequent colonies of *Diphylleia cymosa*, a relative of the May-apple, with leaves a foot in diameter.

Near Highlands, we went to see one of the finest known colonies of *Stewartia pentagyna* and near it the velvet-leaved, dwarf holly, *Ilex Beadlei*.

But now our troubles started. It was decided after a council-meeting to go into the Whitewater country in South Carolina to see *Shortia galacifolia* in its natural habitat. It would probably make an interesting afternoon trip of 20 or 30 miles and we could easily reach Asheville again by dark. So we went blithely

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[4] *Senecio Rugelia* is described in *Addisonia* 20: No. 2. 1937.

WOODY PLANTS WI THRIVE IN NEW YO LESS CONGESTED ZC

1

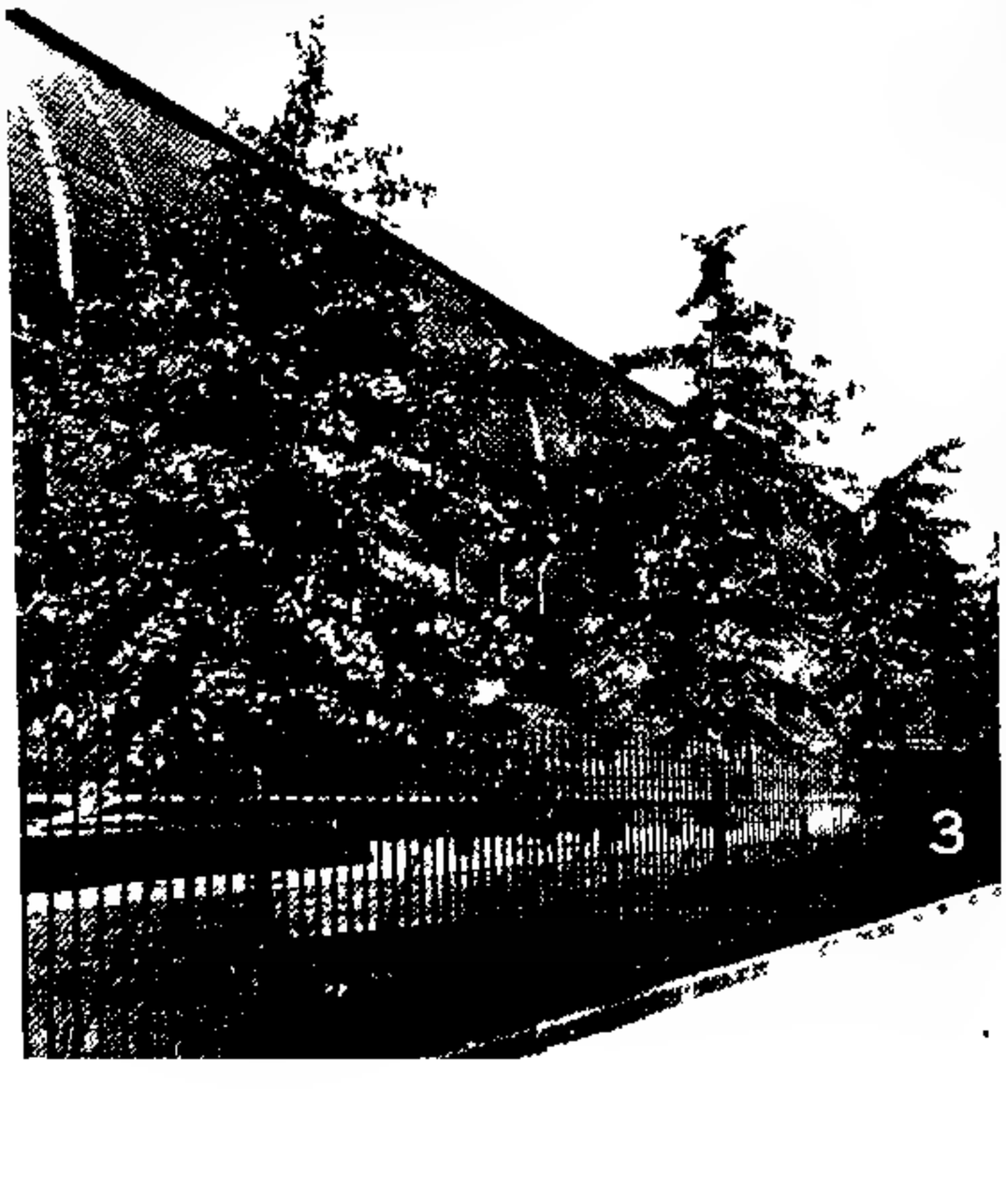
1. *Wisteria reaching to the roof on one of the early houses at Washington Square.*

2. *An American holly 28 feet high growing in Owl's Head Park in Brooklyn.*

3. *A row of young pin oaks, recently planted, gives promise of a fine avenue along 195th St. between Jerome and Reservoir.*

4. *The shingle oak often assumes a flat-topped appearance in the city. It holds its foliage well during the summer.*

2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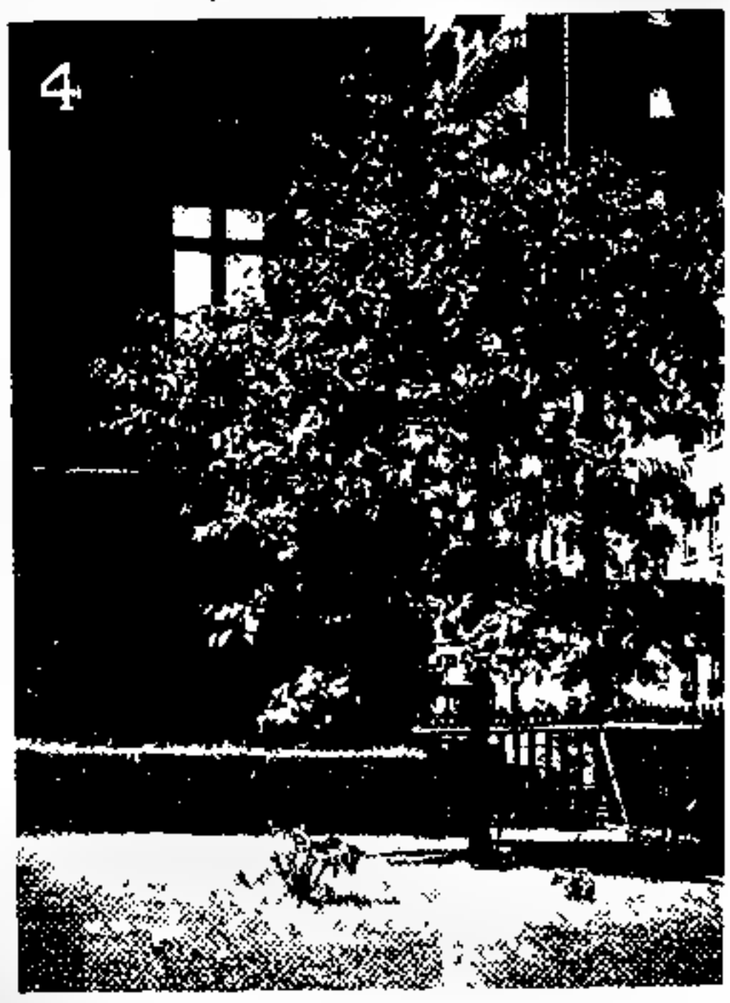
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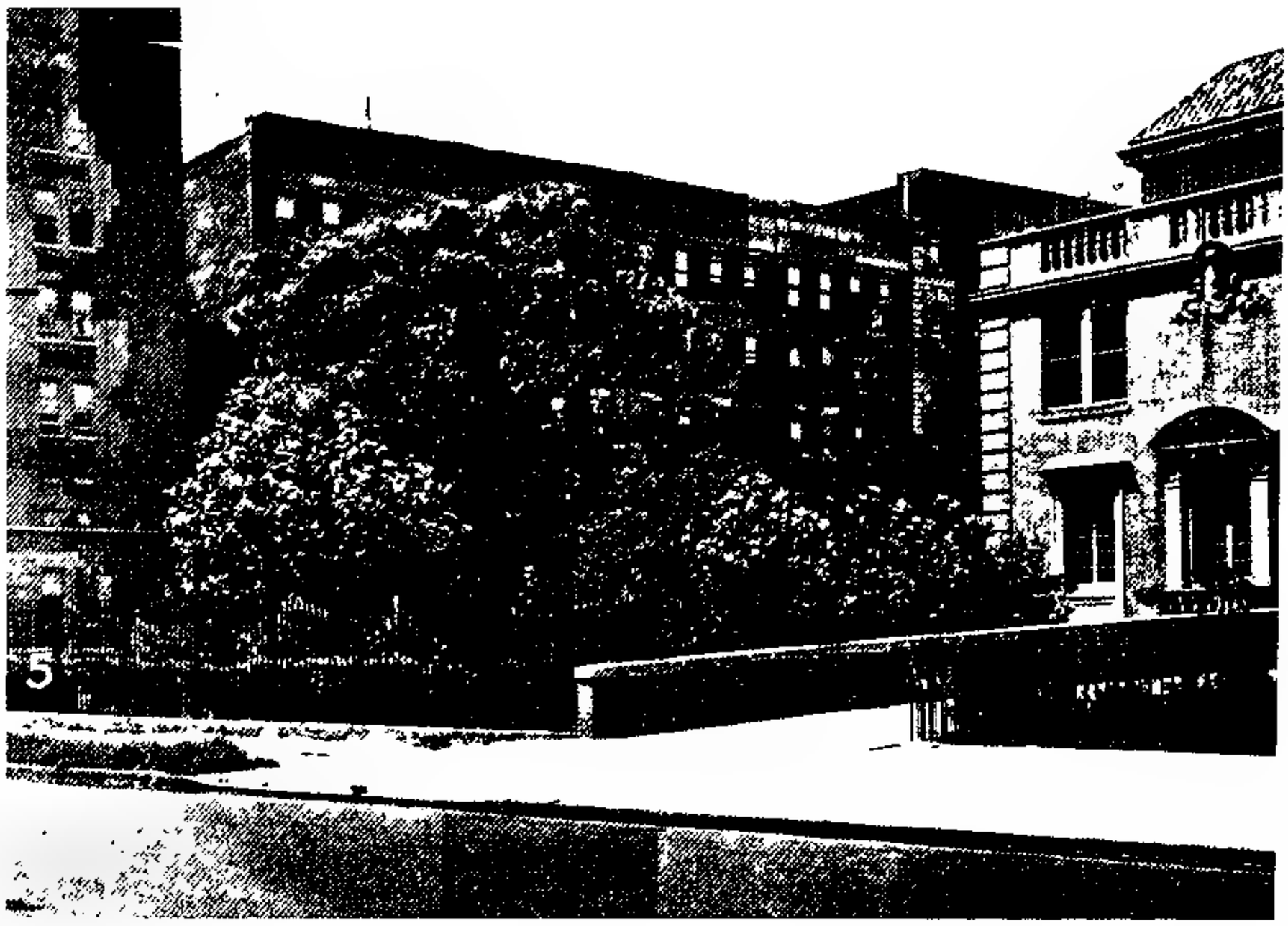
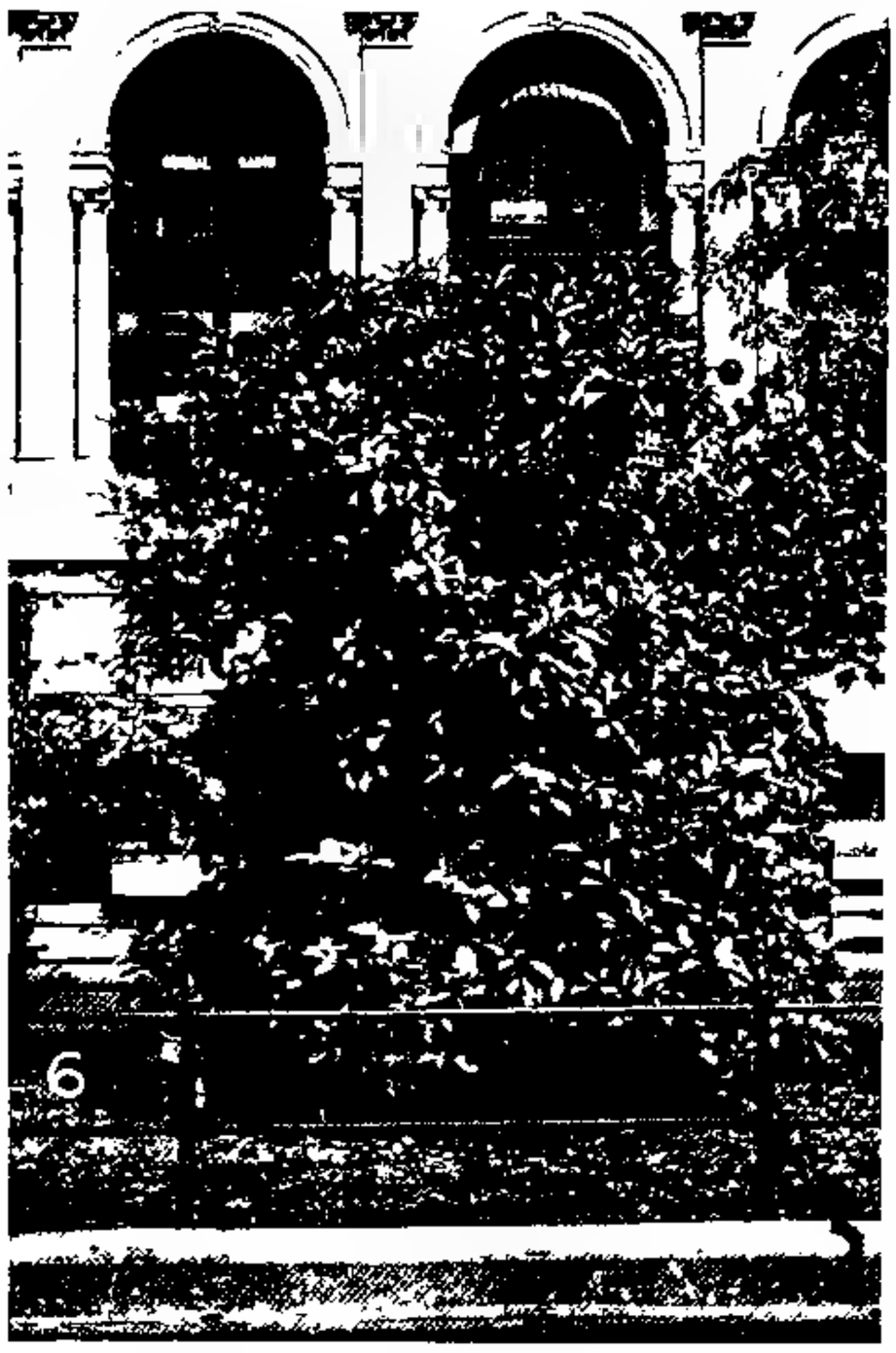


5. *On the grounds of Mother Cabrini Memorial Hospital is a thrifty planting which includes a paulownia, American plane, hackberry, and Lombardy poplar, all bordered by privet.*



6. *The large glossy leaves of Crataegus Lavallei appear luxuriant even after many years on Broadway, in one of the plots near 80th St.*

7. *Paulownia, the empress-tree, reaches its northern limit in New York, and grows even within the city into an appropriately majestic tree. This one is in Central Park.*

Photograph by A. J. Bisaillon

Galax aphylla is one of the commonest of woodland cover plants in the southern Appalachians. This was found on Mount Mitchell. Ralph Pinkus is shown examining one of the candle-like spires of white bloom above the glossy evergreen leaves.

down into Horse Cove, from which we turned into a side road winding down one mountain after another. We knew that our plant grew in damp rhododendron thickets, and we examined many of them. Of course we were not in the Whitewater valley and we knew it, but why should *Shortia* not grow in other valleys where the habitat was similar? We did find beautiful colonies of the large-flowered wild ginger, *Asarum Shuttleworthii* and one patch of the rare *Ophrys Smallii,* a tiny orchid with rather

drab-colored flowers, and many a beautiful woodland stand of *Amianthium muscaetoxicum.*[5]

Black clouds rolled up and rumbles of thunder came nearer and nearer.

Many a head-high thicket of *Leucothoë Catesbaei,*[6] in most perfect development did we see, but no *Shortia*; neither could we find South Carolina, although we had left Horse Cove only three miles from the state line. Finally we crossed the Chattooga River and, quite positive we were in South Carolina, stopped at the first mountain cabin we saw to do some inquiring.

A rather shabby-looking man, a woman, and six children were tilling a small garden patch. The man came over and after a few pleasant amenities, we asked if he had ever seen "little coltsfoot" in this section. He had never heard of it, but stated he was familiar with all the flowers of the region, so we went through all the "common names" under which the plant has been listed in books, but not one did he recognize. In final exasperation a piece of paper was produced and a picture of the plant drawn. Immediately his eyes lit up. "Oh," said he, "We calls that *Shortia.*" He then stated that it grew 15 or 20 miles away in South Carolina, and recommended that we go to Salem, for anyone there could direct us to it.

To Salem we went, finding it only after using the hit-and-miss system in threading a maze of clay farm roads. No one we could find in that town had ever heard of the plant, but said they knew all the plants in the region. One man however knew where Whitewater Falls was and directed us to the place. The road twisted through great thickets of farkleberry, *Vaccinium arboreum,* and finally started to ascend the mountains. It became almost impassable at times with its mudholes and steep stony grades but we blundered through for 18 miles to the accompaniment of frequent rolls of thunder, until we heard the roar of a great waterfall. There in a deep gorge was the 300-foot plunge of the

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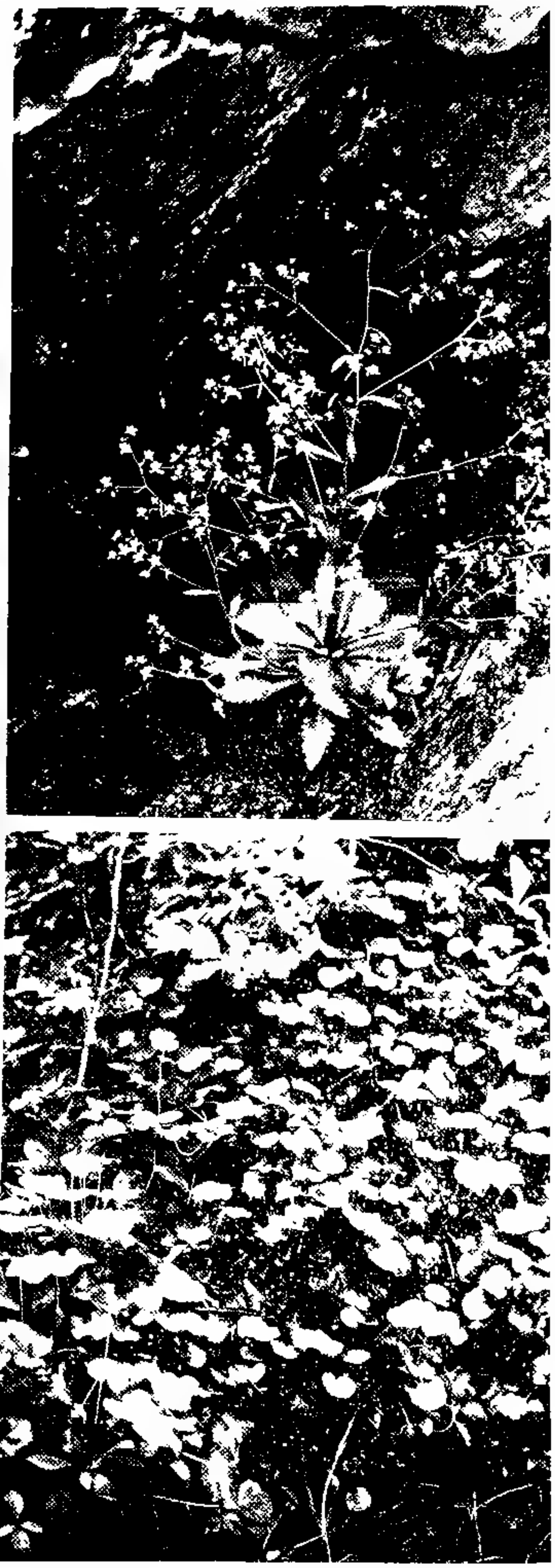
[5] A description of *Amianthium muscaetoxicum* will appear in the next number of *Addisonia.*

[6] Other southeastern plants mentioned here which have been illustrated and described in *Addisonia* are: *Rhododendron carolinianum,* Vol. *1.* No. 1; *Cymophyllus Fraseri 1.* No. 4; *Oxydendrum arboreum 4.* No. 2; *Leucothoë Catesbaei 4.* No. 4; *Gaylussacia brachycera 6.* No. 2; *Shortia (Sherwoodia) galacifolia 10.* No. 1; *Azalea viscosa glauca 11.* No. 3; *Eryngium yuccifolium (aquaticum) 11.* No. 3; *Azalea calendulacea 13.* No. 2; *Sedum ternatum 13.* No. 2; *Dicentra (Bicuculla) eximia 14.* No. 4; *Oenothera argillicola 17.* No. 4; *Pogonia (Cleistes) divaricata 18.* No. 3; *Stewartia (Malachodendron) pentagyna grandiflora 19.* No. 1; *Azalea arborescens 19.* No. 2.

SCENERY AND PLANTS FROM THE STUDENT GARDENER'S VACATION TRIP

Photograph by Samuel Bridge

Whitewater Falls in South Carolina is in a remote mountain section near the tri-state corner. Rhododendron minus stands in the foreground here.



Photographs by E. J

Saxifraga leucanthemifolia, which stands about a foot high, frequents wet cliffs and streamsides in the southeastern mountains, but it is not well known in cultivation. From which the student gardeners brought back from their trip it is hoped to establish this airy-l saxifrage in gardens. Shortia glacifolia "grows like a weed" in its native haunt in a sma in the Whitewater country in South Carolina.

Whitewater River, the cliffs all around covered with *Rhododendron minus* in full flower, truly a glorious sight. Still no *Shortia*. Several hours later we came out on the state highway in North Carolina, with an extensive knowledge of where *Shortia* did not grow. At the last mountain cabin, however, ten or twelve miles back, we had found an old man who had given us the exact locality, and who clearly knew what he was talking about. It was in the Whitewater valley but on the opposite side from where we had been. We spent the night at Lake Toxaway and held another council to decide if the elusive Shortia was worth another day—and concluded that it was. We went to Rosman and took the main road into South Carolina, since this road skirted the far side of the Whitewater valley, and finally found someone who knew where Jocassee was. It was this "village" we had been told to look for. It was necessary for us to be led by another car through the maze of farm roads to an old rambling building which looked as though it had once been a country hotel. It was labeled Camp Jocassee. . . Small wonder it was on no map! We stood on the banks of the Whitewater River in front of Jocassee and wondered what next. Down the road came a barefooted farmer and we drew him into conversation. We asked for this and that place, arousing his curiosity until he asked what we were looking for. Again we drew a picture. "Oh, that weed," he said, "it grows around the spring right over here." We followed him across a bridge into the rhododendron. Yes, it was there, in quantity, carpeting the ground, the stream bed, and the steep walls of ravines through the thickets. We were assured it was a common weed throughout the region, and were also told we were about eight miles from Salem. Shortia's associates were *Asarum virginicum, Viola hirsutula, V. hastata, V pallens, V rotundifolia, Viburnum nudum,* and the climbing hydrangea relative, *Decumaria barbara.* The habitat was exactly what we had thought: wet rhododendron thickets.

Mt. Mitchell, highest point in the eastern states, was our next goal. There, accompanied by no difficulties we saw splendid specimens of *Robinia viscosa*, very rare in the wild, frequent colonies of *Thermopsis fraxinifolia*, and *Galax aphylla.* This region gave us by far the finest display of *Azalea calendulacea* of the trip, to say nothing of the great carpets of *Houstonia serpyllifolia* and *H. purpurea* which fairly outdid themselves. At one place a colony of pure albino *H. serpyllifolia* was found. Above 5,000 feet,

Rhododendron catawbiense ran riot, in all shades of magenta, rosy-purple, and even rose.

The last day was spent in a highly educational trip through the famous Biltmore Estate, where we saw many surpassingly fine plantings of both common and rare plants, native and exotic.

On the way out of North Carolina, we found good colonies of *Symplocos tinctoria Ashei,* an early spring-flowering shrub which is to be tested for hardiness. At Blowing Rock, the crevices were draped with the silvery heads of *Paronychia argyrocoma* interspersed with the rare *Liatris Helleri.*

In the northwestern corner of the state and in adjacent Tennessee we found *Crepis capillaris,* unrecorded before from this far south. On the way back through Virginia, stops were made to see the rather rare *Pachistima Canbyi* and *Clematis Addisonii,* as well as the more common *Anemone lancifolia, Phlox ovata, Allium cernuum* and *Delphinium tricorne.*

Perhaps the greatest value of this 2,000-mile trip was the opportunity of seeing many ornamental and rare native plants in their natural habitats and in the areas where they reach their greatest development. Many of the plants here mentioned are now commonly cultivated, some of them through having been introduced by The New York Botanical Garden, but a fair number still remain to be placed in cultivation or to have their horticultural possibilities worked out. Practically all are being tried out at this institution, for their hardiness and ornamental value.

Of equal value was the sight in the Nik Nar Nursery and in the private nursery of Mr. C. D. Beadle, Superintendent of the Biltmore Estate, of a number of native rarities which we did not have time to seek out in the wild. These were taking their first steps along the road leading to American gardens.

The Gardeners Forum

AS AN unofficial organization among the student gardeners and other members of the gardening staff of The New York Botanical Garden, the Gardeners Forum began its eighth year of activity at the annual meeting held Sept. 19.

P. J. McKenna was re-elected chairman for the year; Joseph Tansey was chosen vice-chairman to succeed Franklin C. Moore; and Wilbur Wright was made secretary-treasurer, succeeding

John T. Moss. Assisting Mr. Wright in planning the subjects for discussion during the year will be George McGregor and Samuel Bridge.

Meeting twice a month during the autumn and winter, the Gardeners Forum gives its members an opportunity to present papers on horticultural topics and to discuss the subjects afterward. Last year, when Howard Swift and Ronald Townsend were on the committee with Mr. Moss in planning the programs, the following subjects were presented by the gardeners named:

Lilies	Fraser MacCartney
Soils and Fertilizers	Edward J. Brennan
Propagation of Trees and Shrubs	John T. Moss
Noteworthy Trees and Shrubs	Donald Moss
Some Current Methods Used in the Propagation and Culture of Plants	Ronald B. Townsend
The Trend of Horticulture	Frank G. Mackaness
Greenhouse Insects and Their Control	George McGregor
Landscaping the Small Home Grounds	C. Nicholas A. Pecora
Rhododendrons and Azaleas	Ralph Pinkus
The Role of Light in the Life of Plants	A. E. McKay
Lawns: Construction and Care	Donald Samson
The Development of Commercial Floriculture	Samuel Bridge

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Current Literature At a Glance*

By Carol H. Woodward

Mushroom Culture. Edmund B. Lambert, writing in the *Botanical Review* for July, deals with a subject of wide appeal, scientific, practical and popular—the principles and problems of mushroom culture. Besides the common *Agaricus campestris,* he mentions a number of other mushrooms which may be subjected to cultivation, though he goes into greatest detail in treating the field mushroom of the American market.

Galapagos. The vegetation of the curious island which for years has been a goal of both scientists and explorers is treated in Spanish in a recent paper-covered volume entitled (in translation) "Galapagos Observed Phytologically." M. Acosta Solis is the author of the book, which is published by the Central University of Quito, Ecuador.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Plant Influence. The possibility that ethylene emanation from fruits may have some purpose or usefulness not yet discovered is suggested by F. E. Weiss in an article headed "The Influence of One Plant on Another," which appears in the April *Journal of the Royal Horticultural Society.* He refers particularly to the discovery of Molisch that the presence of apples promoted the growth of callus in cuttings of poplar and willow and stimulated root formation on willows.

Small Bulbs. Crocuses which flower in autumn are the leading subject in the *National Horticultural Magazine* for July. Alfred Bates, in this article, describes more than 20 species and varieties. In the same issue B. Y. Morrison, editor, treats of "Various Muscari." Besides photographs of the flowers he shows sketches of the bulbs of many species in natural size.

House Plants. What to do with potted plants when they are brought indoors at the end of the summer is told by Esther C. Grayson in the September number of the *American Home.*

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Growing Plants in Chemical Solutions

SOILLESS GROWTH OF PLANTS. Carleton Ellis and Miller W. Swaney. 155 pages, illustrated, indexed. Reinhold, New York, 1938. $2.75.
CHEMICAL GARDENS AND HOW TO CARE FOR THEM. Revised Edition. Anonymous. 19 pages. 1938. Chemical Garden Co., Evanston, Ill. 25¢.
GROWING PLANTS WITHOUT SOIL BY THE WATER CULTURE METHOD. D. R. Hoagland and D. I. Arnon. 16 pages, mimeographed, 1938. University of California, College of Agriculture, Berkeley, Calif.

Popular interest in the growth of plants without soil has been aroused by considerable publicity in the newspapers. This method of growing plants has been variously called water culture, tray agriculture, tank farming, hydroponics, chemical gardening, and so on. The three publications mentioned above were written in response to this interest.

The book by Ellis and Swaney is the most ambitious of the three. Its presentation of the subject is largely uncritical and it contains considerable erroneous and dubious botanical information. In addition to discussing the growth of plants in water culture and in sand or cinder media, other topics—for example, auxins, colchicine and heavy water—which have recently attracted popular notice receive attention from the authors. They discuss their own experiments, including those on rocking troughs simulating the conditions if plants are grown in soilless cultures on ships at sea, as well as experiments by others.

The pamphlet by the Chemical Garden Company gives a straightforward description of the equipment, chemicals, and procedure which may be used in the "water culture" system and incidentally advertises its own products.

Hoagland and Arnon in a mimeographed circular from the California Agricultural Experiment Station give a conservative discussion of the water culture method and procedures for growing plants by the water culture method. They do not believe the water culture metho offers advantages over soil. They say "There is no magic in the growth o plants in water culture," and " . . present indications are that over th course of a year the yield of fruit pe unit area or per plant, of plants grow in fertile soil, will not be significantl different from that of plants grown i water culture."

W. J. ROBBINS.

Forests in Germany

GERMAN FORESTRY. Franz Heske 342 pages, illustrated with photographs charts, and maps; indexed. Yale University Press, New Haven. 1938. $3

The management of forests in Germany as a natural resource to be maintaine on a sustained yield basis has long bee recognized as a precept to be followe by every other country which has becom conscious of its timber heritage. Profes- sor Heske, representing the oldest fores school of academic rank in the world, ha presented the background, the develop- ment, and the present structure of thi management, in an effort to make it technique more available to foresters i other countries. We are indebted to th Trustees of The Oberlaender Trust an to members of the Carl Schurz Memorial Foundation for this volume, for they in- vited Dr. Heske of the Forstliche Hoch- schule, Tharandt bei Dresden, to make a brief survey of American forestry i 1934, and subsequently to conduct a grou of American foresters and lumberme through Germany and Austria. Out o these mutual experiences there develope this volume in German, now made avail- able to English-speaking people by Pro Recknagel of Cornell University an several collaborators.

It is especially interesting to note tha until recently forest management in Ger- many was the concern of individual state rather than of the national government and that only in 1934 was an organiza tion developed comparable to the Ameri can Forest Service in its scope and cen-

tralizing objective. A year later, private forests, which have long played an important role in the sum total of German forestry, came under national supervision, not by way of confiscation, but by technical guidance coupled with self-administration in a manner to avoid bureaucratic tutelage. This national administration, as would be expected in Germany, is highly organized, and each state has its own counterpart. In addition to these strictly governmental agencies, the National Socialist Party has its own forestry agency, the principal purpose of which is said to be the coördination of the entire German forestry structure.

With respect to the natural woodland resources of Germany, we are reminded that the forests no longer are natural forests but cultivated areas, for centuries of colonization have completely removed the primeval stands and therewith have in many cases seriously altered the association of plants. The result today is a land covered with fifteen different types of vegetation, namely, the heath region of northwestern Germany, the western Baltic beech region, the broadleaf and pine region of Pomerania, the spruce region of East Prussia, the north German pine region, the pine-spruce-fir region of Upper Silesia, the spruce-beech-fir region of central and southern Germany, the pine and oak region of the Upper Palatinate and Central Franconia, the alpine spruce region, the broadleaf region of southern Germany, the broadleaf region of western Germany, the oak region of the lower Rhine and Westphalia, the pine and broadleaf region of the Rhine, the bottomland region, and the black soil regions. The total forest area covers 27 per cent of the country, exclusive of the Saar, and this area is not considered adequate to meet Germany's forest needs. In fact, the country has not been self-sustaining in these matters and great amounts of pulp wood have long been imported from Scandinavia.

In addition to these items, culled from this interesting volume, there are chapters dealing with forestry education, the development of land use in Germany, the management of all the various types of forests, employment of labor and other social problems, and finally with forest taxation and fires, two of the most vexing questions concerning our own forest heritages in the United States.

E. H. Fulling.

Five Pounds on Gardening

THE GARDENER'S OMNIBUS. Edited for the Massachusetts Horticultural Society by Edward I. Farrington. 886 pages, illustrated, indexed. Hale, Cushman & Flint, Boston, 1938. $3.50.

"Thirty-nine books in one" is the announcement which accompanies The Gardener's Omnibus of the 109-year-old Horticultural Society which has its headquarters up in Boston. The subjects of the "books" vary from the Garden Calendar, resembling the column which has appeared each week in *Horticulture* for many years, to rock gardens, and include a special section on each of the important groups of plants, such as roses, wild flowers, hedge plants, bulbs, and trees, besides discussions of garden pests, labels, pruning, greenhouses, and many other topics.

Most of the material has appeared in *Horticulture* and the whole book is made up in the style of that weekly magazine —which means that its 886 large pages with heavy covers weigh five pounds. Nearly every page contains at least one photograph of a plant subject being discussed. While many names of experts appear at the ends of articles, the bulk of the book is admittedly written by and for amateurs. Though many statements are made with New England conditions in mind, the articles cover the country in application from coast to coast and from the Gulf beyond the border into Canada.

Carol H. Woodward.

A Fungus-Insect Relationship

THE GENUS SEPTOBASIDIUM. John N. Couch. 480 pages, indexed. Illustrated with text-figures and plates. University of North Carolina Press, Chapel Hill, 1938. $5.

A volume entitled The Genus Septobasidium by Dr. John N. Couch, Professor of Botany at the University of North Carolina, has recently appeared. This work was started more than ten years ago, and at that time this fungus genus was represented by about 75 species, while the present volume contains descriptions of 176 species, many of which have been described as new by the author of the work.

The introduction presents a description of the life histories of some of the typical

species of this genus, and the account reads like a fairy story. The interesting and intimate correlation of the fungus with its insect host is almost unbelievable. All of the species of this genus are parasitic on scale insects, which in turn suck their nourishment from the plant host on which they live. The fungus appears not to be able to live without the insect on which to feed. The insect, on the other hand, is able to live but fails to prosper in isolation.

As the author points out, this is not a clear case of parasitism where the fungus lives purely at the detriment of its insect host. In return for its enforced hospitality the fungus very generously provides minute houses in which the insects live and by which they are protected from the attacks of their natural enemies. Under this arrangement, which is referred to by the author of the book as a symbiotic relationship, many of the individual insects must sacrifice themselves to the well-being of the fungus, but others that are not so sacrificed receive the protection of the fungus and in turn are able to reproduce their kind and thus continue their own existence at the same time insuring the continual existence of their fungus protector.

Mycologists will find this one of the most interesting volumes that has appeared in recent times, and the author is to be congratulated on his valuable contribution to science.

F. J. SEAVER.

Exploring in Burma And Tibet

PLANT HUNTER'S PARADISE. F. Kingdon Ward. 347 pages, illustrated with photographs; appendix; index. Macmillan, New York, 1938. $3.50.

Looking down the list of names of plants that have been introduced into horticulture directly through the explorations of Mr. Kingdon Ward, one sees such already familiar names as *Aster himalaicus*, *Cotoneaster microphylla*, *Enkianthus pauciflorus*, and *Prunus Puddum* (*P. cerasoides*). And if one were living in the British Isles, where the less hardy species of *Rhododendron* thrive, where *Meconopsis* can be grown and where certain species of *Primula* and *Berberis* do not turn up their toes in the heat of midsummer or cold of winter, one would find many more names that in recent years have entered catalogs, gardens, and flower shows.

In the appendix to Plant Hunter's Paradise there are listed some 300 names of plants which the author has been responsible for introducing. Each time that he writes a new chapter (the story of his fourteenth expedition into Asia is now running in the *Gardeners' Chronicle* of London), he mentions newly discovered plants which offer possibilities for the still greater enrichment of gardens.

In Plant Hunter's Paradise he gives a tantalizing glimpse of his lifetime work in search of Asiatic plants which may be introduced into gardens on other continents. This is the story of his entry into Tibet over a pass unknown to white men from the valley of the Adung river in upper Burma. It is lightly, pleasingly written, with just enough plant description to satisfy the botanist without annoying other readers with technicalities. It is a good tale, both as a story of travel and adventure and as a background for the plants to be grown in tomorrow's gardens.

CAROL H. WOODWARD.

Tree Care for the Amateur

OUR SHADE TREES. Ephraim Porter Felt. 187 pages, illustrated with photographs, indexed. Orange Judd, New York, 1938. $2.

Of the many books and periodicals published on the care of trees few if any contain such a wealth of helpful information as this popular-priced book by the well known entomologist and tree authority, Dr. E. P. Felt. Little more could be said in as simple and understandable a manner on such a subject.

Each of the eight chapters is outlined in the table of contents. Dr. Felt then commences with a general discussion of the place of trees in the world, their economic and historical importance, their relation to man and to the tree expert himself. Ensuing chapters deal with environmental factors affecting trees; tree wounds and cavities; the selection and planting of trees, and a full chapter on the pests and diseases of trees and their control. Such a synopsis might seem complete, but no, we find thirty-one interesting illustrations as well as several helpful graphs. The whole book, including the captions to the photographs, is admirably readable, and shows th

author's keen sense of tree problems and of the important place of trees in the community.

Throughout there is a general feeling that only experts are capable of managing the various difficulties encountered in the culture of trees. It is true there is no one better equipped to cope with problems of tree culture than the expert, but it would be more gratifying to the amateur if he could handle many of the smaller problems which this book fails to explain in adequate detail. This can readily be overlooked when such other more important problems have been so thoroughly treated—for example, the detection and knowledge of tree deficiencies. After all, the analysis of symptoms is the prime requisite for any successful diagnosis.

JOSEPH W. TANSEY.

Auxins and Other Compounds

PLANT GROWTH SUBSTANCES. Hugh Nicol. 108 pages. Indices of substances, authors, and plants. Leonard Hill Limited, London, 1938.

This is the fourth book on plant growth substances which has come to the reviewer's attention; the others are the text by Boysen-Jensen, the translation and revision by Avery and Burkholder of Boysen-Jensen's book, and the text by Went and Thimann. Although entitled "Plant Growth Substances" this book is largely limited to a discussion of the "auxins" and compounds having similar effects. Brief reference is made to vitamin C as a growth substance, to pantothenic acid, thyroxin, male and female sex hormones, Bottomley's auximones and other substances, but rather surprisingly no mention is made of bios or of the thiamin (vitamin B_1) system.

The first two chapters are addressed to the lay reader but the absorption of the author in the chemical aspects of the structure, synthesis, and origin of the growth substances discussed makes the balance of the book heavy reading for the laity.

It is apparent from the author's discussion of the use of potassium permanganate on rooting that he is unfamiliar with the extensive work of Curtis on this subject. He is apparently unaware also of the negative results of Deuber in experiments designed to test Oddo and Pollacci's report of the substitution of magnesium 2-pyrrole-carboxylate for iron in the growth of plants. Altogether the book is a stimulating discussion, and, though not exhaustive, it should be a part of the library of any one especially interested in plant growth substances.

WILLIAM J. ROBBINS.

Darwin—A New Portrait Of the Naturalist As a Man

CHARLES DARWIN. Geoffrey West. 359 pages, illustrated, indexed. Yale University Press, New Haven, 1938. $3.50.

It is not merely as the great naturalist who formulated the theory of natural selection as the basic mechanics of organic evolution that Geoffrey West paints his portrait of Darwin in this latest biography; it is rather of a fanatically honest and inoffensive man who, in spite of almost insurmountable handicaps of life-long ill health, became so obsessed with an idea that its ultimate publication more profoundly influenced the thinking of subsequent biologists than any previous or succeeding idea.

The story begins, as must all tales of Charles Darwin, two generations before his birth, for at that time the association of two prominent lineages had its inception. Physician Doctor Erasmus Darwin attended his patient Josiah Wedgwood and both became life-time friends as well as the grandfathers of Charles. The botanical publications of the versatile Erasmus were numerous and significant, and among them was foreshadowed that idea of a struggle for existence which was so immortally promulgated later by his grandson Charles.

But many years intervened before the day of the Great Work, as Charles Darwin regarded it. In the meantime we read of Charles' happy days at Shrewsbury, at a time when all Europe was astir over the Napoleonic struggles, but to which Charles paid little heed. He was in school at the time, slow to learn and not at all scholarly. His father a physician, he too entered the profession, not from any desire to do so, but rather to please his forbear. It was all in vain, however, and next he entered the clergy "where any man, wise or foolish, studious or sporting, could find a niche according to his talents."

Soon, however, his interests wandered into natural science, into collecting, and

particularly into geology. And then came the great opportunity, Charles' acceptance of which haunted him for many years to come, for he feared he had displeased his father, as he probably had. It involved his becoming naturalist on the famous round-the-world voyage of the *Beagle,* an adventure which took him from England five long years. Teneriffe, the Cape Verde Islands, the Brazilian jungles, the Rio Plata, Patagonia, Tierra del Fuego, Chile, the Galapagos, Tahiti and New Zealand, lay ahead of him and in each of these places he spent varying periods of time. He was only twenty-three at the time when the voyage began, but his earlier excursions into natural history had already gained for him the recognition necessary for this appointment. It was with an open mind, devoid of preconceptions, and still as a student of the Gospel, that he undertook the assignment and labored through the long journey, still hoping for his father's forgiveness. Frequent spells of sea-sickness were the nemesis of his folly, but despite his recurring periods of misery Darwin's keen powers of observation and his collecting mania have since made the voyage memorable in the annals of science.

Finally he returned to England with a diary of some 189,000 words and a constitution so impoverished that for nearly forty years, it was said, "he never knew one day of the health of ordinary men." It was his stomach that wrought such misery during the remainder of his days and incapacitated him so severely that for years at a time he was unable to work more than a few hours a day. Had it not been that he chose an ideal wife in his cousin Emma Wedgwood his misery might have been even greater and the world deprived not only of immortal scientific contributions, but of an inspiring example of industry despite ill health. By way of compensation, Darwin was financially independent, the beneficiary of the family fortune which permitted him to pursue his studies and leisurely life unhampered by any bread-earning responsibilities. He had long enjoyed an annual income of perhaps £1500, but his father's death raised it to nearly £5000.

Fifty years were devoted to studying and writing about geology, coral reefs, insect pollination, and variation of plants and animals under domestication, as well as sexual selection, earthworms and other phases of natural history. The culmination of it all was the announcement in 1858 of the Theory of Evolution by Natural Selection, and the publication in 1859 of The Origin of Species. By 187. this work was in its sixth and last edition and despite the inevitable criticism of all great works it had withstood the test and was established as a great contribution.

Darwin frequently feared lest publication of his ideas offend people. This angle of his nature bothered him particularly when he was led into a consideration of Man himself. Finally, his convictions prevailed and "The Descen of Man" appeared. But the most interesting incident bearing on the human relations of this man was with respect to Alfred Russell Wallace, his contemporary In the midst of Darwin's labors he received an essay from this colleague which contained the very essence of Darwin's long pondered ideas and which seemed to take all originality from his own work But Darwin knew no malice and passed the essay on for publication. His reward lay in the greater fame attached to his own work later and in the friendship and recognition which came from Wallace.

EDMUND H. FULLING.

Notes, News, and Comment

Storm Damage. In the heavy storm which struck New York Sept. 21, The New York Botanical Garden lost about fifty sizeable trees, practically all of which were native species, particularly oaks and ashes, besides a few elms. These large and usually durable trees succumbed to the wind chiefly because the rocky ground had long impeded their root-growth and they did not have sufficient anchorage for their heavy tops. There was less damage than had been expected in the Hemlock Grove, where thirty trees were uprooted beyond the point of reclaiming them. Many other conifers were leaning after the storm, but they have been straightened and braced. The ornamental plantings of collection material suffered comparatively little damage. Most of the uprooted trees were at the edge of the woods and around the site of the old Lorillard Mansion.

While branches were broken from many of the dahlias, which were just entering a promising season of bloom,

and the hardy asters, just beginning to open, were whipped almost beyond recognition, both plantings recovered enough to present an excellent showing of flowers around the first week in October. The hardy chrysanthemums did not seem to feel the effects of the storm.

At the Arnold Arboretum Dr. E. D. Merrill reported the damage from the storm to have been the worst in the history of the institution. "A hurried survey made the next morning," he wrote, "shows that approximately 1,500 trees were either uprooted, broken off, or their tops so badly damaged that they will have to be removed." Wind velocity 12 miles distant was recorded, he said, at 187 miles an hour, and certainly it blew well over 100 miles an hour at the Arnold Arboretum at Jamaica Plain.

Autumn Flowers. In The Garden's display of autumn flowers this year around the main conservatory, an announcement of which was sent to members Sept. 30, 900 dahlias in 400 varieties are being shown, and 70 different kinds of hardy asters ("Michaelmas daisies") occupy a border containing 2,500 plants. Chrysanthemums are expected to be in good bloom around the middle of October. Of these there are 3,000 plants in 72 varieties. The hardy and tropical waterlilies have been exceptionally fine this year and their blooming has been continued well into the autumn.

Board. Mr. Pierre Jay, President of the Fiduciary Trust Company, was elected to the Board of Managers of the Botanical Garden in the class of 1939 at a meeting of the Board Sept. 16.

In Chicago. Dr. W. H. Camp was invited to lecture at the Field Museum in Chicago October 1 on "Winter in Oaxaca." He also spoke at Northwestern University. Before returning to New York he went to St. Louis to investigate species of *Vaccinium* from the Ozark Mountains at the Missouri Botanic Garden.

Geneva. Dr. A. B. Stout spent a week at Geneva, N. Y., the middle of September to study and evaluate the season's work in the breeding of hardy seedless grapes. While there he attended the meeting of the New York State Fruit Testing Association, where he spoke briefly on the new seedless grapes.

Visitors. Dr. David Crawford, President of the University of Hawaii, visited The New York Botanical Garden Sept. 6 on his return from a three months' tour of Europe. He was at one time professor of botany at Pomona College.

F. G. Walsingham, Director of the Harvard Botanical Garden in Cuba, spent several days at the end of September at The New York Botanical Garden studying the living collections of tropical plants. He was on his way back to Cuba after three months spent at Kew Gardens in England on a special commission for working with tropical plants.

Prof. William Randolph Taylor, specialist in algae, stopped at the Garden in mid-September on his return to the University of Michigan from Woods Hole, Mass., where he had passed the summer.

Frank G. Mackaness, who was returning from a summer at his former home in England, visited the Botanical Garden early in September before going to New Orleans, where he is heading the horticultural department at Dillard University.

Bernice G. Schubert of the Gray Herbarium spent a week at the Garden in September working on the genus *Desmodium.*

Rev. John Brett Langstaff has been a frequent visitor in his search for biographical material on Dr. Samuel Bard, the nineteenth century physician who took over the practice of Dr. David Hosack to enable the latter to spend more time on the Elgin Botanic Garden of which he was the founder.

Joseph A. Manda, retired orchid grower of West Orange, N. J., came to the Garden during September, bringing a number of fine orchids with him.

E. P. Killip of the Smithsonian Institution spent a week working on a collection of Venezuelan plants at the Garden in September.

Among others who have registered in the Library during recent weeks are Theodore L. Steiger of Wellesley College; E. P. Felt of the Bartlett Tree Research Laboratories, accompanied by G. M. Codding; E. D. Merrill of Harvard University; A. LeRoy Andrews of Cornell University; Kenneth F. Baker of Honolulu; Arthur Herrington of the International Flower Show; Margaret McKenny; Dr. William S. Thomas; M. L. Fernald of the Gray Herbarium; F. Raymond Fosberg of the University of Pennsylvania; Henry Teuscher of the

Montreal Botanic Garden; Leon Croizat of the Arnold Arboretum; Ernest Rouleau of the University of Montreal; Wanda K. Farr of the Boyce Thompson Institute; Clyde Fisher of the American Museum of Natural History and Mlle. Germaine Plouse of Bordeaux, France, who is doing pathological research at Louisiana State University this year.

Lectures. Opening the first of a series of lectures arranged for patrons of the flower show in Greenwich, Conn., T. H. Everett spoke the evening of Sept. 20 on "Rock Gardens." The show is sponsored by the Westchester and Fairfield Horticultural Society, with the co-operation of the Greenwich, Riverside, and Hortulus Garden Clubs, the Little Garden Club of Rye, The Green Fingers, and the Woman's Club Gardeners. Mr. Everett addressed the Westport Club in Connecticut Sept. 16 on "Garden Soils and Their Improvement" and the South Orange Garden Club Sept. 28 on "Bulbs and Annuals from South Africa."

Dr. H. N. Moldenke lectured to the Mount Vernon Garden Club Sept. 19 on "Botanizing in Florida." On Sept. 25 he led a combined field trip of the Torrey Botanical Club, Newark Museum Nature Club, and the Naturalists' Club of Newark in the Watchung Mountains.

Dr. B. O. Dodge spoke at Baraboo, Wisc., before the University Club with the Garden Club as guests Sept. 18 on "Growing Healthy Plants at The New York Botanical Garden."

Mycological Foray. Traveling to Duchesnay, northwest of Quebec, where the Forest Rangers School acted as hosts, Dr. B. O. Dodge, Dr. F. J. Seaver, and Mr. Robert Hagelstein were among the 70 persons who attended the annual foray of the Mycological Society of America, beginning August 23 and continuing to the end of the week. Two weeks of rain which were followed by fairer weather, combined with the royal entertainment which was offered throughout the session, made the forav an unusually successful one. Mr. Hagelstein addressed the group on myxomycetes and Dr. E. B. Mains of the University of Michigan gave a lecture on color photography. The events also included, outside of collecting trips, excursions to the surrounding country and motion pictures of Canadian scenery and life.

The Gardening Staff. Donald Dodds, a former student gardener, who was at the Botanical Garden until December 1935 returned to the Garden in September as assistant foreman gardener in the greenhouse and has been assigned to Range 2. He has been greenhouse assistant under Mr. J. G. Esson at the Mrs. Roswell Eldridge estate at Great Neck since leaving the Garden.

John Borin, who has been assistant foreman at Range 2, is being transferred to Range 1 as assistant foreman.

M. Truman Fossum, formerly assistant foreman at Range 1, has enrolled this fall at Cornell University.

Stephen G. Cutting returned from Europe October 1. After a year as exchange student gardener at Kew, he had arranged for a year of work at the Berlin-Dahlem Botanic Garden, but left after little more than three months there.

After a season spent working in a nursery in Switzerland, Albert Gebert, a former gardener at the Botanical Garden and a graduate of the science course, also returned to this country in September.

To Yale. John T. Moss, a student gardener who received his certificate from the Garden's science course last spring, is leaving October 15 to organize a new department for the propagating of plant material for Yale University's ornamental gardens. The work, which will come under the management of the Bureau of Planting, will chiefly be done in the greenhouse of a small estate which has recently been bequeathed to the University. The place is adjacent to the botanical garden at Yale in New Haven. Mr. Moss began work at The New York Botanical Garden two years ago as an apprentice, and shortly after was appointed a student gardener.

Inez Mexia. Having contracted a chronic illness while collecting botanical specimens last spring in Oaxaca and adjoining states of southern Mexico, Mrs. Inez Mexia died July 12 in Berkeley, Calif., at the age of 58. Her specimens, located in the various herbaria of the world, including The New York Botanical Garden, leave evidence of her long continued activities as a plant collector in the relatively little known portions of the western hemisphere from Alaska into South America.

THE NEW YORK BOTANICAL GARDEN

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A. C. PFANDER ..... *Assistant Superintendent*

MEMBERSHIP IN THE GARDEN

Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

The classes of membership and types of benefaction are as follows:

Annual Member	annual fee	$ 10
Sustaining Member	annual fee	25
Garden Club Affiliation	annual fee for club	25
Fellowship Member	annual fee	100
Member for Life	single contribution	250
Fellow for Life	single contribution	1,000
Patron	single contribution	5,000
Benefactor	single contribution	25,000

Contributions to the Garden may be deducted from taxable incomes. The following is a legally approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

NOVEMBER, 1938

CHRYSANTHEMUMS IN NOVEMBER AT THE GARDEN
Cover Photograph by Fleda Griffith

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THE AMATEUR BOTANIST

When a search is made in the annals of the biological sciences, there are found, beside the names of professors and institutional research workers, many persons not engaged by any organized body whose contributions to science rank with those of the professional.

These are the amateurs in the scientific world—men and women who make well ordered collections of natural objects, who classify them, perform experiments, or otherwise study them, purely for the love of the work or for the satisfaction which their service to the world may bring to them.

Even Darwin was an amateur. He studied for the ministry, but gave it up for a hazardous expedition. When he returned he fortunately was able to live on an income for which he did not have to labor. His scientific studies were therefore an engrossing pastime. He never earned a living as a professional biologist; hence, famous as he became, he must be classed as an amateur.

Mendel also was an amateur. He worked out the basis of the theory of inheritance which is accepted today while serving as a monk in an Austrian monastery.

In our own day and right here in New York, much valuable botanical research is being contributed by amateurs whose work may justly be envied by many a professional botanist. Kenneth K. Mackenzie, a corporation lawyer and a member of the Garden's Board of Managers, was a world authority on the sedges. Raymond Torrey, a newspaperman, became an authority on the lichens. Addison Brown, one of the founders of the Garden and the collaborator of Dr. N. L. Britton, was a New York judge who was absorbed in his avocation of botany.

The list of amateur botanists now living whose names will go down in the history of the science is almost endless. Their work is frequently as important as that of the professionals. And every painstaking collector of plants or logical experimenter in this field is making a proportional contribution to science.

To these people The New York Botanical Garden opens its doors and offers them, so far as its facilities permit, the co-operation of the staff and the supervised use of the equipment, the library, and the collections.

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The Contribution Of Botanical Gardens To Community Life

By William J. Robbins

(*Adapted from an address given before a joint conference of educators and other community workers at Teachers College, Columbia University, July* 22, 1938.)

THAT botanical gardens contribute materially to community life is self-evident from their persistence as parts of our social organization. Botanical gardens have existed from the days of Aristotle and Theophrastus (340 B.C.) to the present and many of the gardens of today are old as human institutions go. The Jardin des Plantes in Paris was founded in 1635; the Botanical Garden at Berlin in 1646; the Botanical Garden in Edinburgh in 1670; that at Rio de Janeiro was begun in 1808; the famous garden at Buitenzorg, Java, in 1817. The Royal Botanic Gardens at Kew, perhaps the most famous of them all, is nearly 100 years old. The Missouri Botanical Garden and The New York Botanical Garden were founded in 1889 and 1895 respectively.

Why are there botanical gardens?

Fundamentally, the existence of botanical gardens is because of the importance of plants. Plants in the last analysis are the source of all the foods we eat; they maintain the oxygen content of the air; they are the chief primary source of those important accessory foods, the vitamins. In addition, plants supply us with wood, turpentine, drugs, perfumes, flavorings and spices, oils and fats; from them we make our paper, their fibers or their hairs are used for cordage and clothing, and from the cellulose of

their bodies chemists make cellophane, artificial silk, powerful explosives, and other products. Plants cause many of our most destructive diseases and are responsible for many important commercial fermentations. The economic value of plants is of the greatest importance.

But in addition, plants are things of beauty, not only in mass as in a landscape but as individuals. Some part, frequently their flowers, leaves or seeds, is often the motif from which a formal artistic design is developed. The beauty of form and color of plants, even though they had no economic value, would alone justify the interest in them which is demonstrated by the existence of botanical gardens.

Botanical gardens are museums of plant life, in which some exhibits are living, changing from day to day and year after year, and others are preserved for permanent reference and display. Botanical gardens are necessarily affected by whatever conditions affect other museums. What I have to say, therefore, on the contribution of botanical gardens to community life applies, in the main, to the contributions made by other types of museums; modified, of course, by the differences in the type of material dealt with.

First. Botanical gardens, if located in cities, are bound to be places of recreation. They are antidotes for the artificiality of city life. Through their beautiful grounds and plantings, sufficiently varied and changing in character to avoid the monotony often associated with the conventional park, they offer release from the tension of city life. Beauty is an intangible and cannot be weighed and measured or valued in units. That such intangibles, however, play a great role in determining healthful lives has long been recognized and is now an accepted principle in sociological planning. There was a time when botanical gardens and the relaxation they offered were the perquisites of men of private means or adjuncts to royal courts. In accordance with the progress of the times they have become the common privilege of all.

Not long ago a visitor to The New York Botanical Garden said to me after inquiring for some directions: "You see, I'm out of a job, and I sit at home for hours sometimes wondering what the future holds. I get so I can't stand it any longer. Then, after tramping the streets some more, trying again to find some

work, I get on the Elevated and come out here to the Garden. That way I can forget my troubles for a time. Those evergreens are just like some that stood behind the house when I was a boy."

In thus emphasizing the recreational aspects of a botanical garden I do not wish to give the impression that such an institution is to be regarded as a park or playground. There *should* be parks and playgrounds—they have their place in community life, and it is an important one; but any botanical garden developed primarily as a park or a playground misses, in my opinion, the unique contribution to recreation of which it is capable. For through its ordered plantings outdoors and under glass, with the careful labeling of specimens and groups, and through its museum exhibits, library services, and lectures, a botanical garden can provide educational as well as merely pleasurable forms of recreation.

Second. Going further, a botanical garden contributes to community life by acting as a reliable center of information on plants. With its facilities and its trained staff it is a storehouse of knowledge about the handling of plants, the kinds of plants and their uses, and the properties and sources of plants. The New York Botanical Garden, for example, answers questions of all sorts about plants, some by mail, some by telephone, some in person, covering every conceivable topic. A few of the more recent include queries on such subjects as: how to control rose mildew; what tropical flowers will match certain shades of nail polish; what plants form a suitable background for a marble statue; where a certain rare wood may be found; what is the name of a particular plant; how to build a penthouse garden; the exact spot in British Columbia in which a certain rare plant may be obtained for introduction into commercial horticulture; where to get cow manure; what books to read on gardening; why there are no blue roses; what information exists on chemical gardens; where to secure large quantities of ragweed pollen for studies on hay-fever; whether a mattress stuffing was kapok, as claimed, or an illegal substitute; whether the grape-like fruits (which proved to be those of the moonseed) included by a housewife in her jelly made it inedible.

A large botanical garden with its world-wide contacts, its library, herbarium, and its trained staff, is peculiarly capable of furnishing reliable information on plants.

Third. Its function as a demonstration area is important. A fine sod, a well-grown tree, a model garden, a planting of flowers or shrubs is not only a pleasant, it is an inspiring sight: it shows individual gardeners what they too can do with plants and encourages them to achieve fine results in their own gardens. Much as we value the passive enjoyment of flowers, shrubs, and trees, we must admit that productive activity is of greater value. A botanical garden thus contributes to community life by providing inspiring models as well as by serving as a center of information for all people who wish to have gardens or are otherwise concerned with plants.

Fourth. From what I have said it is clear that a botanical garden is also an educational institution. The chief functions of a teacher are to inspire the interest of an individual in a subject and supply the means of satisfying the interest aroused. Again through its collections and plantings, its library, and its staff, the botanical garden performs these functions. This type of education, however, is unorganized and informal, it is individual in character.

Most botanical gardens carry on a planned educational program, frequently in association with the public schools or colleges. It is my opinion that while such programs are of value, they run the danger of duplicating educational agencies already provided or of taking over functions which an organized school already existing can perform.

There are, however, some organized educational efforts which can best be done by a botanical garden: for example, the training of gardeners; and some botanical gardens maintain schools for gardeners in which both practical and theoretical work are combined. These courses extend over two or three years and provide training difficult to secure elsewhere. In fact, the combination of theory and practice possible makes a botanical garden especially fitted for the education of gardeners.

Certain types of adult education also may be carried on with advantage. The lecture course has long been used by botanical gardens and other museums for this purpose; but I believe that a greater contribution can be made to adult education if botanical gardens will sympathetically encourage the formation of groups interested in the study of plant life, and provide these groups with some guidance and with facilities for their work. No botani-

cal garden with which I am acquainted is at present equipped to do this type of work adequately, though some have made a beginning in this direction. What I have in mind is provision of rooms where groups with a common interest in some phase of plant life may meet and, through discussion and exchange of ideas, educate themselves, and where they may come in intimate contact with the institution's staff and facilities. It should be emphasized that a certain amount of equipment and guidance are necessary if this kind of adult education is to be successful. It is not enough merely to maintain a museum and a garden, even though both are of the very best quality. There must be opportunity for individuals themselves to become active.

Finally, a botanical garden contributes to community life through its scientific work. Knowledge is still incomplete on some phases of the cultivation of plants, their protection against insects and diseases, the development of new varieties, and many other subjects. Botanical gardens do their part in finding answers to these questions through exploration and research. The science of today becomes the popular knowledge of tomorrow, as new facts and processes are discovered and disseminated by an institution like a botanical garden to that part of the public which can use the information.

There is not space to discuss in detail an ideal scientific program for a botanical garden, but its guiding principles should be these:

1. The questions investigated will vary with the location and resources of the garden.
2. The program should be fundamental and not superficial.
3. The program should be concerned at least in part with questions of local significance; say, the adaption of plants to a city environment.
4. Gardens located in cities with world-wide connections like New York City should have world-wide interests and be concerned with investigations of world-wide importance.

In summary I may say that a botanical garden contributes to community life by providing recreation, by fostering scientific advancement, and by serving the public as a source of information and inspiration and as an educational agency.

Some Chronicles In Grape History

By A. B. Stout

I.

THE Grape family (Vitaceae) includes about ten genera and a total of nearly 500 different species. All these are woody plants with climbing, semi-climbing, or somewhat bushy habits of growth. In all cases the fruit is a berry, but for most members the berries have little flesh and are not edible. Certain species, especially of the genera *Ampelopsis* and *Parthenocissus,* are important to man only as ornamental vines. But most species of the genus *Vitis* (the grapes) have fruits that are edible. From the best of these the cultivated grapes of today have been derived, either by selection within a species or by hybridization between species followed by selective breeding.

The species of *Vitis,* as now recognized by botanists, number between 40 and 50; and of these about 30 are native to the area of the United States. All the species are found in temperate and semi-tropical regions of both the New and the Old Worlds, but exclusively in the northern hemisphere.

Vitis Vinifera in the Old World

Of the wild grapes of the Old World evidently only one type, *Vitis vinifera,* became important in early cultivation. The culture of this grape began at a remote prehistoric date, and in time extended rather widely over certain of the warmer parts of Europe, Asia and Africa. Many clones which differ rather decidedly in individual characteristics came into existence. In grapes the so-called horticultural variety is merely an individual seedling that has been multiplied by vegetative propagation, hence any unusual plant that appears may be multiplied for culture as a clonal variety. The numerous variations in these grapes are indeed noteworthy for their diversity. But it is not unusual for such differences to arise within a single species, especially after long cultivation with selection of diverse individuals which then cross rather freely in the production of their fruits.

The *vinifera* grapes include table, wine and raisin grapes. Usually the fruit has a high sugar content, rather solid or meaty flesh

and a rich flavor called "vinous". In the quality of their fruit the best of the vinifera grapes undoubtedly surpass all grapes of other types now in culture. But the vinifera grapes have rather fleshy and tender roots and a constitution not suited to the colder parts of the temperate zone.

Vinifera Experiments in the New World

The attempts to establish the culture of vinifera grapes in eastern North America were persistent and extensive over a period of nearly 250 years (1619-1850). Lord Delaware, John Winthrop, William Penn, and Thomas Jefferson were among the many persons who contributed time, thought, and financial support to this project. Land grants and cash subsidies were made by colonial assemblies and later by both state and national governments. Experienced grape growers or "vine dressers" were brought from Europe. Societies were formed to promote coöperation in the efforts and to provide financial support. Nurseries, especially the famous Prince Nursery at Flushing, Long Island, took an active and leading part in importing the types of European grapes, in experimenting with the culture of them and in propagating them for distribution in America. In many settlements in every colony from Massachusetts to Georgia and inland to Kentucky, Ohio, and Indiana, attempts were made to establish the culture of the European grapes. Everywhere there was dismal failure.*

Reasons for these failures are now evident. The vinifera grapes are unsuited to outdoor culture in the United States except on the Pacific Coast where they thrive in a culture that is now extensive and truly phenomenal. The extremes of temperature and humidity that occur east of the Rocky Mountains, the cold temperatures in the more northern sections, and the rather extreme susceptibility of the vinifera grapes to the grape root-louse (*Phylloxera vastatrix*) and to three fungous diseases† combine to give the fatal weakness that dooms these grapes for commercial culture anywhere in eastern United States.

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* Those who may wish to read in more detail interesting accounts of this epoch of horticultural failure are referred to the volumes "The grapes of New York" by Hedrick and "The evolution of our native fruits" by Bailey.

† Black rot of grapes (*Guignardia bidwellii*); powdery mildew (*Uncinula necator*); and downy mildew (*Plasmopara viticola*).

Grapes and Botanical History

It was destined that grapes suitable for culture in eastern United States were to arise through the use of native species in hybridization and selective breeding. But this was not to be accomplished or even attempted until such methods were sufficiently understood as scientific knowledge and were reasonably demonstrated in practice. Thus the status and the progress of this phase of grape history were dependent upon the advances made in botanical knowledge during the period from early colonial days to the Civil War in the United States.

Belief in acclimation. Horticulturists of this period shared in the rather universal belief of the time that the character of a plant will change as a direct response to environmental influences and also that acquired characters will be passed on to the offspring by heredity. This belief was no doubt a potent influence in the long-continued efforts to establish vinifera grapes in culture in eastern United States. Although this view continued to be rather firmly held as a theoretical belief, the efforts to acclimatize these grapes gradually gave way during the first half of the 19th century to hybridization and selective breeding.

Knowledge of sexual reproduction in plants. At the beginning of the colonial period it was not definitely known that plants have sexual means of reproduction which involves a pollen parent as well as a seed parent in seed reproduction and makes hybridizations possible. The credit for first clearly demonstrating this is frequently given to Camerarius, whose experiments and conclusions were recorded in a letter published in 1694 and again in 1696 in volumes that are among the rarest of botanical publications. Various aspects of sexual reproduction, especially in respect to the necessity of pollination for fruit and seed formation, had long been observed, but not understood, in the culture of such unisexual plants as the fig and the date. But the knowledge presented by Camerarius and others who followed him demonstrated that seed reproduction in plants is essentially a bi-parental process.

It is to be noted that a rather popular volume by Richard Bradley on "New Improvements of Plants and Gardening" was published in seven editions between 1717 and 1739. This somewhat widely distributed book described the functions of the pistils and stamens of flowers in seed formation, discussed variation among seed progenies as due to cross-fertilization and emphasized

the value of selecting the best plants as parents in the efforts to improve cultivated plants. Thus the importance of considering the pollen parent as well as the seed parent in selection was emphasized and clearly presented. Eventually this knowledge was applied and extended in the work of breeding grapes.

Selective breeding within species. The famous seed-breeding firm of Vilmorin-Andrieux in France was established in 1727, and among the outstanding contributions of this firm were the methods of selection by progeny tests which culminated more than 100 years later in the breeding of the sugar beet (1840-1850). In England, Knight (1806-1840) working with inter-varietal hybrids of garden peas observed dominance, recessiveness, and segregation of characters. Van Mons in Belgium studied the seed progenies of various fruits (especially pears) and published a valuable monograph (1835) on the results which he obtained. Le Couteur (1836) and others made and reported extensive studies of selections in various of the cultivated cereals. The main objectives of the methods of pedigree selection thus developed are to sort out the most valuable strains and to keep them pure by preventing inter-breeding of different varieties and cross-pollination with poor strains. Thus a rational basis was laid for more adequate methods of selective breeding both within and between varieties of the same species and their hybrid progeny.

Hybridizations between species of plants. Then for about a century the crossing of one species with another also received much attention. This was in the years between 1760 and 1860. In Germany, Koelreuter (publications from 1761 to 1766) and Gaertner (1849) reported extensive experimental hybridizations which had resulted in several hundred different hybrids. But these studies were chiefly academic in purpose and scope. Among the other hybridists of note during this period were Herbert, Lecoq and Naudin (1827-1864) who, to some extent, were concerned with practical results in obtaining new types of plants of value to horticulture.

Several of these earlier hybridists and plant breeders held views far in advance of their time. Many of the methods of modern breeding and various of the accepted doctrines of genetics were developed by them. Yet much of their work, especially in hybridization, was dominated by the dogma that species are fixed entities and that hybrids between true species are necessarily sterile, unfruitful, and of no value. Also in the popular mind and in

ecclesiastical circles, it was widely held and advocated that hybridization must be a sacrilege and an abnormal if not pervertive process. But these views gradually gave way before the accumulation of evidence, which was summarized and presented in the publications of Charles Darwin‡, that hybridization is a natural and effective means of producing variation and is of much practical value in breeding plants.

Hybridization in Grapes

Natural crosses. Dame Nature herself played an active and important role in the production by chance hybridizations of new grapes of merit. At many places in eastern United States over a period of about 200 years, vinifera grapes were grown in the vicinity of wild vines of native species. This provided opportunity for chance hybridizations.

Possibly the first printed words which condemned further efforts in the culture of vinifera grapes and recommended certain grapes believed to be native were those of Thomas Mease in The Domestic Encyclopedia (1804). Mease praised certain "native" grapes which were then being grown with considerable success. One of these, known as the ***Alexander Grape,*** illustrates how these grapes originated.

It is stated that the original vine of the ***Alexander Grape*** was found by John Alexander, gardener for William Penn, growing on a hill near the Schuylkill River near the site of an old vineyard of European grapes. The fruits had a "foxy" flavor characteristic of the wild *Vitis Labrusca;* the pulp was firm, juicy, and quite sweet, and a good wine of the claret type could be made from it. Also the berries were oval in shape. It is now believed that this grape was a chance hybrid. Thomas Jefferson considered the wine made from the ***Alexander Grape*** "worthy of the best vineyards of France" and in 1809 he wrote regarding it as follows: "I think it will be well to push the culture of that grape without losing time and efforts in search of foreign ones, which it will take centuries to adapt to our soil and climate."

For several years this grape was the principal clone grown in the area about York, Pa., where some 150 acres of vineyards were in existence in 1826. Certain over-enthusiastic vineyardists and

‡ 1859, On the Origin of Species. 1868, The Variation of Animals and Plants under Domestication. 1876, The Effects of Cross and Self-fertilization in the Vegetable Kingdom.

nurserymen distributed this grape under the names ***Tokay*** and ***Cape*** and claimed it to be a vinifera type. This grape was the first hybrid of a native American grape which was generally grown with commercial success.

The ***Isabella Grape*** appeared in 1816 and soon became an important clonal variety for the more northern states. Its characteristics are strongly like those of *V. Labrusca,* but the flowers are perfect, the berries are oval, and the vine is susceptible to mildew, all of which indicate that there is *V. vinifera* in the parentage.

The ***Catawba Grape*** was first noted in 1823 and it soon became the most popular commercial grape in America. Even now after more than a century in culture it is the chief wine grape grown in New York State. This grape strongly resembles the wild *V. Labrusca* but its flowers are perfect, the fruits are vinous in flavor, the plant suffers from attacks of mildew, and many of its offspring show characters of the vinifera type. It appears that this truly important grape is also a chance hybrid in origin.

Advocates of hybridization and breeding in grapes. The botanist Nuttall of Harvard University recognized (about 1815) that certain grapes which were then being cultivated with considerable success were undoubtedly of hybrid origin and he definitely proposed that hybridizations between native American grapes and vinifera grapes would surely result in grapes suitable for culture in North America.

In his volume, Vine Dresser's Guide, which was published in 1826, John Dufour notes that the breeding of grapes will require many years of work and he pleads that this could best be done in a botanical garden. A few years after the publication of Dufour's book the extensive experiences which the several generations of the Prince family of the famous nursery at Flushing had had with grapes were summarized in the volume, A Treatise on the Vine (1830). It was recognized that the more hardy of the grapes then in cultivation in eastern United States were without doubt natural hybrids. It was stated that 10,000 grape seedlings had been grown at the Prince Nursery from seed collected from "every variety of consequence". That at least some individuals of outstanding merit did not arise among these many seedlings is indeed difficult to understand. The Prince Nursery grew the best of the natural hybrids of that day from some of which seeds may have been planted. But evidently no attempts

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A. B. Stout

1. *Panorama at Naples, N. Y., one of the principal grape-growing regions in the state.*

Courtesy of Garre

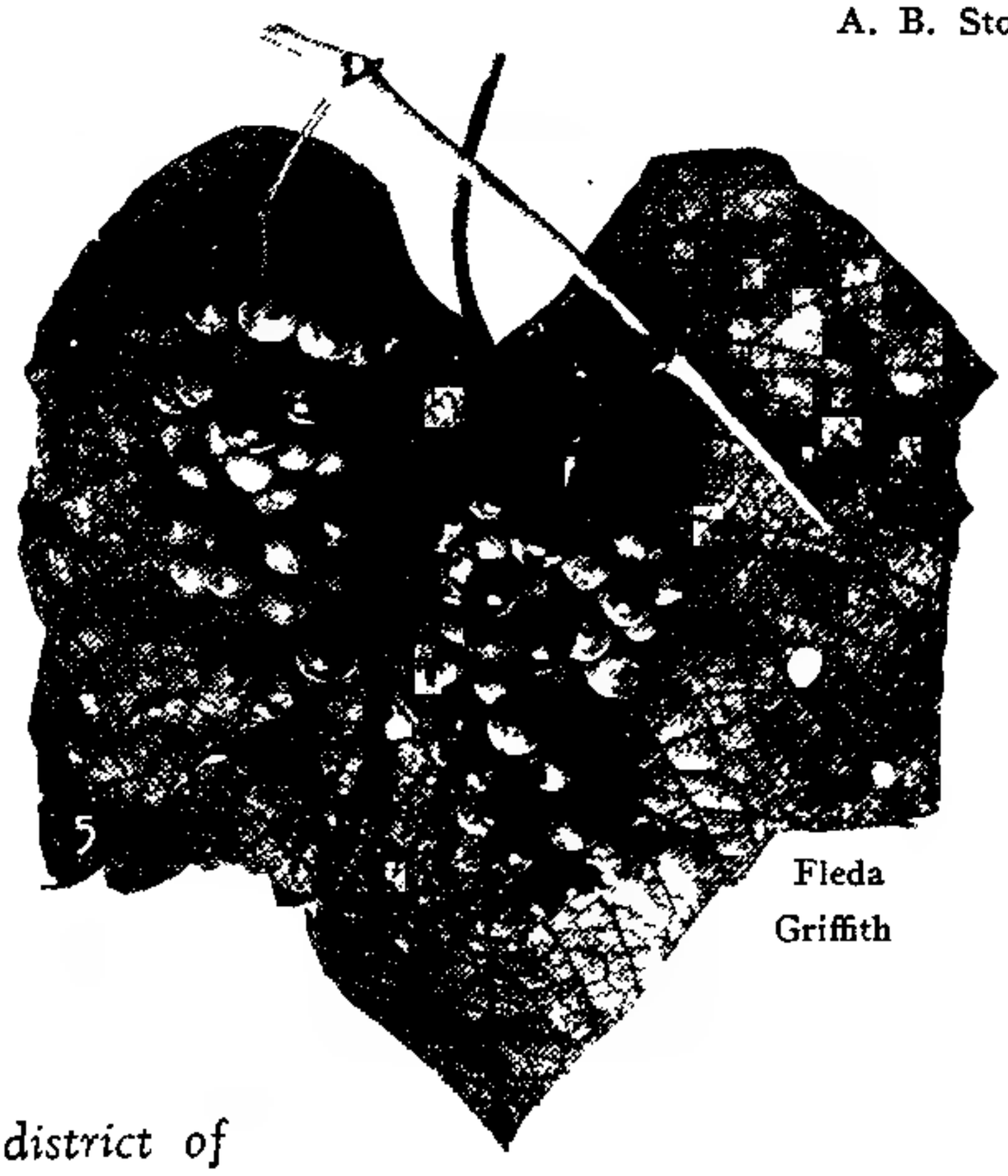
2. *The main trunk of one of the oldest grapevines in America, the famous Scuppernong (Vitis rotundifolia) which covers an acre near the coast of North Carolina. It was discovered in 1585.*

3. *Characteristic vineyard of the south, at Southern Pines, N. C.*

U. S. Bureau of Plant Industry

4. *Wild grapes (probably Vitis vulpina) as they appear frequently in the northeastern states.*

A. B. Stout

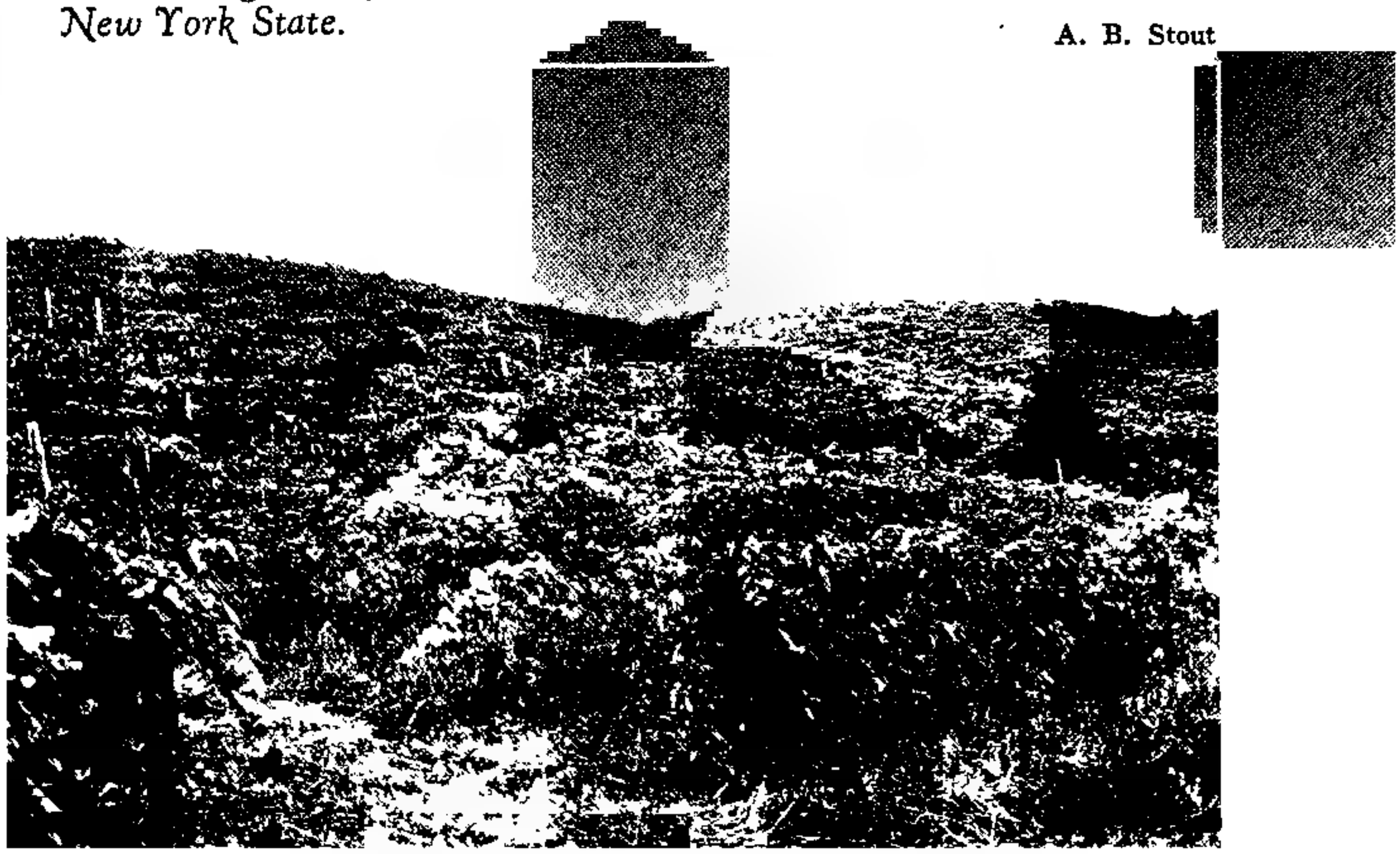


5. *Vitis argentifolia, a native grape which is abundant in the vicinity of New York.*

Fleda Griffith

6. *Typical vineyard in the Finger Lakes district of New York State.*

A. B. Stout



were made to control pollinations or to compare the progenies of different parents. Yet definite recommendations were made that the best of the species native in America be used in hybridization with vinifera grapes.

Planned breeding. The first deliberate hybridization in grapes was evidently not undertaken until about 15 years after the volume by Prince was published; but possibly the effort was inspired by this volume. In 1845, Dr. William W. Valk of Flushing, Long Island, where the Prince Nursery was located and well known, wrote an interesting paper on hybridization in plants which was published in Hovey's Magazine (11: 134). But Dr. Valk practised what he advocated. He obtained pollen from a vine of the ***Isabella Grape*** and applied it to pistils of flowers of a vine of the ***Black Hamburg.*** Thus one of the best of the "native" grapes of hybrid origin was itself hybridized with one of the best of the vinifera grapes. At least one seedling was grown from the seed thus obtained and its fruit was exhibited in 1852. The bunches of the fruit were large; the berries were large, black, and vinous in flavor; the vine was vigorous and hardy. For a time this plant was grown under the name ***Ada.***

The ***Concord Grape*** and its origin are of special interest in this connection. In 1852 Ephraim Bull exhibited before the Massachusetts Horticultural Society the fruit of a seedling which was destined to make grape history under the name ***Concord Grape.*** According to his statement Mr. Bull transplanted a wild vine to a place in his garden near a vine of the ***Catawba Grape.*** Later he collected seeds from the wild vine, planted them, and thus obtained the original seedling which was propagated as the ***Concord Grape.*** The vines of wild grapes which bear fruit have imperfect stamens, hence it seems certain that the ***Catawba*** vine was the pollen parent of this seedling. The ***Catawba*** itself is believed to be a hybrid with vinifera ancestry. Hence the ***Concord Grape*** is to be regarded as a plant which has a vinifera parent in its ancestry.

Fruit of a definitely known hybrid was exhibited in 1854 in Massachusetts. Some ten years earlier deliberate cross-pollinations were made using a vine of the vinifera grape ***Golden Chasselas*** as a seed parent and a vine of the ***Isabella Grape*** as a pollen parent. From the seed thus obtained a seedling of considerable promise was grown and distributed under the name ***Allen's Hybrid.*** This grape had various characteristics which

plainly indicated a vinifera parent and it proved to be not hardy. For some reason this grape attracted more attention than did Dr. Valk's hybrid of earlier origin and it was widely publicized as a demonstration of what may be accomplished by hybridization in grapes.

(*To be continued*)

Mushroom Poisoning

By Fred J. Seaver

RECENTLY a practising physician called at the writer's home with a paper bag full of orange-yellow mushrooms, stating that a patient of his had eaten of this mushroom and was very ill. The physician wished to know the name and nature of the suspected offender.

The fungus was readily identified as *Clitocybe illudens*, commonly known as the Jack-o'-lantern fungus because of its phosphorescent glow in the dark. Though considered poisonous, it is not one of the deadly forms, and there is some difference of opinion on its toxicity, since its reactions are known to vary with

Photograph by Fleda Griffith

Clitocybe illudens, a saffron-yellow mushroom with a phosphorescent glow in the dark. It is a poisonous species.

the individual. McIlvaine, the old authority on mushrooms, states: "This fungus is so inviting in quantity and beauty that one turns from it with a regret that lingers. Eaten in quantity it acts upon some persons as an emetic. I have several times eaten of it without other than pleasurable sensations, but persons partaking of the same cooking have been sickened." M. E. Hard, another authority on mushrooms, states: "I have known people to eat it without harm, but the chances are that it will make most persons sick. It ought to be good, since it is so abundant and looks so rich."

This fungus occurs in large clumps in very late summer and autumn, and is so attractive that there is no wonder some persons attempt to eat it not knowing its identity or the danger involved. However, the case which has just come to our attention emphasizes the fact that notwithstanding its tempting appearance, this fungus should not be used as an article of food. Neither should any other mushroom be so used until its identity has been learned and its qualities are known.

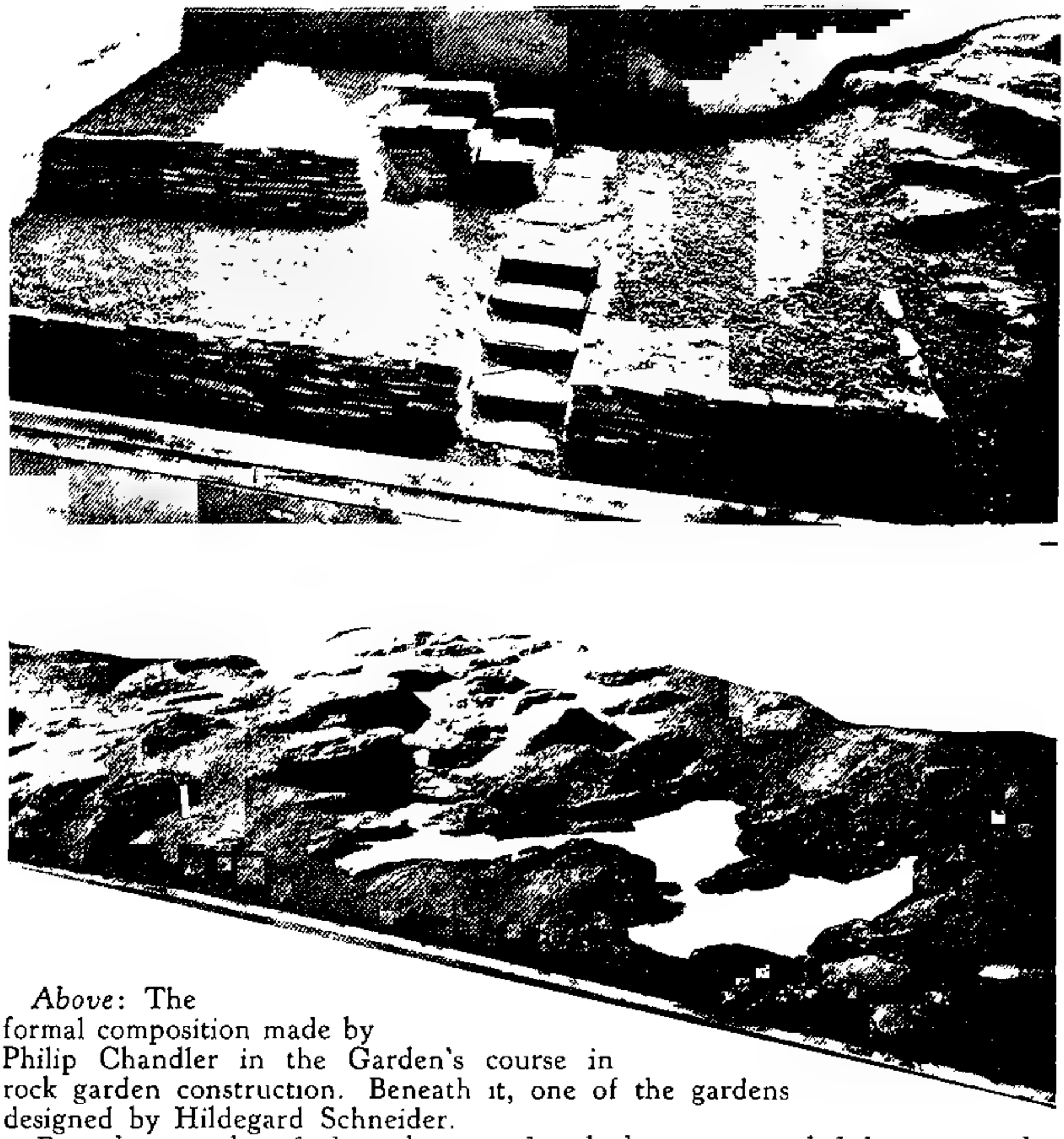
* * *

Rock Garden Award to Mrs. Schneider

Highest honors in the course in rock garden construction which was given during the summer at The New York Botanical Garden were awarded to Hildegard Schneider, who completed two models, each of which the judges rated above all the others. Since completing the science course for professional gardeners in 1936, Mrs. Schneider has been in charge of planting in the Thompson Memorial Rock Garden.

Second honors went to Donald Samson, a student gardener; third to Ned Irish of Bronxville, N. Y.; and fourth to Dorothea Mierisch of New York City, an artist, a member of the Garden, and at present a student in the new certificate course in practical gardening. Fifth place was shared by Robert F. Simpson, who built two models, and Philip Spear, both of whom are student gardeners.

Special mention was given to Philip Chandler, exchange student gardener from Kew, for a formal composition which the judges did not consider competitive. Two members of the course constructed models to be copied on their own home grounds. The highest rank given was 79⅔, on a basis of 90 possible points:



Above: The formal composition made by Philip Chandler in the Garden's course in rock garden construction. Beneath it, one of the gardens designed by Hildegard Schneider.

For photographs of the other panels which were awarded honors in the course, see page 266.

30 each for principles of construction, for scenic value, and for grading. The judges were J. G. Esson, superintendent of the Mrs. Roswell Eldridge estate and instructor on trees and shrubs in the practical gardening course; P. J. van Melle, manager of the Poughkeepsie Nurseries; and Joseph Tansey, greenhouse foreman at the Garden. The models were built to scale to cover approximately 50 square feet and were made of stratified rocks and a composition soil. There were 18 people in the course, which was given under the direction of A. C. Pfander.

During the judging, each of the model rock gardens was designated only by a number. Each judge inspected the work of the class at a different time, so that the scoring of each was independent of the others. The gardens receiving honors are illustrated here.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Explorers of the Pacific

VIKINGS OF THE SUNRISE. Peter H. Buck. 335 pages, illustrated with photographs, indexed. Frederick A. Stokes Co., New York, 1938. $3.50.

Probably no other writer has been so excellently equipped to record the saga of the Polynesians as Te Rangi Hiroa, the son of a Maori mother and a father from a north of Ireland family. Te Rangi Hiroa is better known as Dr. Peter H. Buck, Director of the Bernice P. Bishop Museum of Honolulu, and "Vikings of the Sunrise" blends the knowledge derived from his ethnological studies with the lore which is his maternal heritage.

Few human migrations have the romantic appeal of the Polynesian, and perhaps none has had so intriguing an area to enter as was the vast Pacific when Dr. Buck's ancestors first turned their eyes to the eastern horizon. "Vikings of the Sunrise" tells of these migrations in readable and often beautiful language, and the author has not hesitated generously to intersperse his scientific facts with legends, mythology, and illustrative chants. The work contains many fine photographs.

There is no doubt in the author's mind that the route of Polynesian migration was through the Micronesian island groups of the Carolines, Marshalls, and Gilberts, rather than through Melanesia. Great emphasis is laid upon the common ancestry of all Polynesians in fairly recent times, and the main body of the book deals with their dispersal throughout the "Polynesian triangle" from the original center in the Society Islands. From this point, probably from the island of Tahiti, the early explorers, perhaps the greatest sailors in history, traveled to such remote groups as Hawaii, the Marquesas, Easter Island, New Zealand, and Samoa.

Of greatest interest to those concerned with plants is the chapter on "The Trail of Plants and Animals," which the author concedes must have been across Melanesia rather than the Micronesian atolls. From the eastern extremity of Melanesia (the Fiji Islands), such food plants as the breadfruit, banana, yam, and taro, and such animals as the pig, dog, and fowl were carried into Polynesia by early intercourse between the Samoans and Fijians.

The most splendidly adventurous voyage of all was to America. Thus Dr. Buck disposes of the knotty problem of how the sweet potato, an American plant, came to be widely dispersed in Polynesia long before the advent of the first whites. He makes a voyage from the Marquesas to the Peruvian coast seem very plausible, and indeed there is no reason why the intrepid seafarers, having reached the Marquesas, should not have sailed still farther east in search of new land, and found America. The unknown adventurer who led this expedition is credited by Dr. Buck as having made the greatest individual contribution to the records of the Polynesians.

A. C. SMITH.

Wine From The Hills

BUBBLING WATERS. Clark B. Firestone. 296 pages, illustrated, indexed. Robert M. McBride and Company, New York, 1938. $2.75.

From the land of the Cherokees along the Oconalufta to the ancient "licks" of Indiana, and thence through the hill-country to the Tuscarawas:—here are the boundaries of a region where life still follows the tempo of that past our fathers knew. Into these, the last of our wildernesses, Clark Firestone went in search of that magic which Pliny said "doth lie in bubbling waters." It is a multitude of things were there: Spring in the Bluegrass and long-legged colts in the pasture; the trail of the raider Morgan; stories of old Dan'l Boone; the laughter of Kentucky folk; and peace on mountain tops. These things he found—and many more –and now he brings them to us in a series of yarns as refreshing as

that sparkling wine drawn from the cool springs which feed the swift-running streams of the region dominated by our Southern Appalachians where, sometimes, there is no other sound "save the phoebe's cry . and the sighing of a wind fragrant with balsam." If you like our Southern Highlands (and who doesn't?), this is a book you will want to read.

W. H. CAMP.

Correvon on the Flowers of Waters, Marshes, Fields, and Woods

FLEURS DES EAUX ET DES MARAIS. H. Correvon. 243 pages, illustrated with drawings and colored plates, indexed. Delachaux & Niestlé, Neuchatel and Paris. 1938. 12 Swiss Francs.
CHAMPS ET BOIS FLEURIS. H. Correvon. 201 pages, illustrated with drawings and colored plates, indexed. Delachaux & Niestlé, Neuchatel and Paris. 1937. 12 Swiss Francs.

The newest botanical book in the series called "Les Beautés de la Nature", published in France and Switzerland, convinces one without effort that some of the world's most beautiful flowers grow in and near the water in the mountains and valleys of Switzerland.

After describing the aquatic and palustrian flora, past and present, of his country, Henry Correvon leads the reader on an enchanting tour, everywhere closely studying the flowering plants of the ponds, the marshes, the damp shorelines, and even the woods surrounding these watery places. While serving as an agreeable story-telling guide from place to place and season to season, he manages to slip in his plant descriptions so unobtrusively that when you turn the page to a sketch or a colored plate of the subject, you recognize it and feel that you could find it next time yourself if you went alone flower-hunting in Switzerland.

Though Correvon has long been known for his work with alpine plants, his book on aquatic plants, apparently a newer study, has more of an immediate appeal than his Champs et Bois Fleuris, in the same series, of which the second edition appeared in 1937. This is largely because the colored illustrations of the moisture-loving plants are scattered through the book, instead of being bunched at the back where they spoil each other's effect, and partly because the captions in the more recent work are descriptive instead of being appended as mere labels.

But in both books there is plenty of good reading matter: scenic and botanical descriptions, a background of biological or geological history, a taste of folklore, and a bit of poetry, besides, in the book on the "flowering fields and woods", several chapters on gardening in which the author goes far away from his country to find plants that are suitable for cultivation.

In both books there is a helpful choice of botanical names wherever desirable, as well as a number of common names for nearly every plant, and an abundance of references to which the enthusiast may turn for further information on the plants and places mentioned. The colored plates and drawings by Mlle. S. Rivier and Paul-A. Robert add value and pleasure to both volumes.

CAROL H. WOODWARD.

'Way Down Upon . . .

SUWANNEE RIVER. Cecile Hulse Matschat. 296 pages, illustrated, indexed. Glossary and bibliography. Farrar and Rhinehart, New York. 1938. $2.50.

While the Suwannee river may not be one of America's great streams as to size, great it will always be so long as Stephen Foster's song exists. Aside from the river itself, however, which is a typical southern stream, interest lies in the people of the land through which it flows. Little exists of their early history and legend, but this book tells about the present inhabitants of the region, their customs and superstitions, their folklore, and their reminiscences of early days or the stories told by the old folks.

Mrs. Matschat describes her trip from the little explored depths of the Okefenokee, down the river to the Gulf of Mexico. It is a story of typical country people of the region, told in a much more understanding way than is customary with visitors to this section. Throughout one is fascinated by the easy writing style and the interesting manner of presentation. The author obviously kept her eyes and ears open, and has sympathetically told of her dealings with the people, presenting many humorous incidents, and giving as much of the regional history as could be obtained in so short

a time. There may be those whose appetites are so jaded as to object to a stream so historically insignificant in the publisher's set of American rivers, but this reader, for one, finds the book so fresh and enjoyable in its reliable picture of the swampland and the Suwannee as to have no space for adverse criticism.

E. J. ALEXANDER.

The Grass of Many Waters

ALGAE. The Grass of Many Waters. Lewis Hanford Tiffany. 161 pages, illustrated with 41 plates (colored, halftone, and line drawings) and 12 diagrams; indexed. Charles C. Thomas, Springfield, Illinois, 1938. $3.50.

It is seldom that the busy scientist takes time from his work to present to others—except in the most technical manner, and rarely for the layman—the results of his labors. It is less often that the one who does fully understands what it is that others want to know, or is able to present it in an interesting manner. Fortunately, Dr. Tiffany is such a man. An authority on the algae, he brings to his writing the necessary background; his sympathetic understanding of the layman's viewpoint has given him judgment and insight into what should be included in the text. Besides, he is that rarity among authors—one who knows what he wants to say, says it, and then stops—for it is a book with no unnecessary verbiage or useless padding. In short, it is a good book and one which, dispassionately and with a certain subtle humor, presents a truly comprehensive story of the algae. It is a book which leads us to a better understanding of that multitude of curious plants which inhabit our ponds, streams and oceans; those microscopic forms which flourish inside the leaves of tropical plants; which somehow grow on bare desert rock; in arctic snow; or for that matter, which live even in our own alimentary tracts.

W. H. CAMP.

Exploring the Mad Mountains Of Equatorial Africa

MOUNTAINS OF THE MOON. Patrick M. Synge. 221 pages, indexed, illustrated with photographs, colored plates, and sketches. E. P. Dutton, New York. 1938. $4.

Would you read of the Mountains of the Moon, that snow-capped central African range which lies so near the equator and possesses, besides the snow-peaks, those fantastic forests of heather in whose depths there is such weird, dank silence? Here lobelias, to us such lowly herbs, go mad and run up into fifteen-foot columns, while groundsels, even more lowly weeds to us, become great gnarled and twisted trees, giving to the landscape an aspect prehistoric and bizarre.

Into this region a British Museum Expedition went in 1934-5 to study the plant and animal life in its natural environment. Its members learned much of this strange world, explored a valley not before visited, and the little-known Nyamgasani lakes with their strange and almost unbelievable setting. In the volume by their organizer we learn of the moods of these mountains and of the natives of Uganda, to say nothing of the difficulties of exploration. Several other of the equatorial ranges were visited, where there is the same type of country.

The story is interestingly told and well written, and the book is richly illustrated with pictures of many of the plants seen as well as of the natives and the scenery. Of especial merit are the sketches by the artist of the expedition, Stuart Somerville. There are two appendices, one dealing with the legends surrounding this region and the other with the garden possibilities of the plants.

E. J. ALEXANDER.

Building a Good Rock Garden

COMMON SENSE IN THE ROCK GARDEN. James H. Bissland. 217 pages, illustrated and indexed. De La Mare Garden Books. New York. 1938. $2.50.

Although any number of good books on the subject of rock gardens have been written, most of them are too technical and complicated for the garden-minded public in general. Therefore, James H. Bissland's book, Common Sense in the Rock Garden, should certainly fill a definite place in the amateur gardener's library. This book is not intended for the botanist or the collector of rare and choice alpine plants, but rather to guide and help the beginner with his problems in creating an ornamental rock garden.

Simple rules and instructions for various kinds of gardening with rocks are

given, including the natural outcrop, the boulder type, the making of walls, sunken gardens, and pavements, all with helpful sketches and illustrations for the setting and grouping of stones and plants.

Lists of the easier growing and more showy kinds of plants which are particularly suitable for these types of gardens are included in this book, with special reference to when and how to plant, general maintenance and upkeep, effects of color combinations, the use of evergreens for winter coloring, background of material of trees and shrubs, and notes about the cultural methods of these various kinds of plants.

Common Sense in the Rock Garden is a clearly written, sensible book; it will solve many beginners' problems.

HILDEGARD SCHNEIDER.

Dogwood Trees in Color

PORTRAITS OF DOGWOODS. Adolf Müller. 22 pages illustrated in color. Published by the author, Norristown, Pa. 1937. $1.

Few men have taken a greater interest in the native American flowering dogwood than Adolf Müller of Norristown, Pa., and he pays well-deserved tribute to what he calls "the most outstanding flowering trees in the whole of the temperate part of the world" in the booklet which he has prepared and published himself. A dozen large photographs of the trees in full flower are reproduced in color, and the text tells of historic dogwood trees and of American and world-wide interest in this species.

CAROL H. WOODWARD.

Fifty American Trees

KNOWING YOUR TREES. G. H. Collingwood. 109 pages, illustrated, indexed. Bibliography. American Forestry Association, Washington, D. C. 1937. $1.

An exceedingly praiseworthy project has been started by the American Forestry Association. That is, to publish good photographs of all familiar American trees together with such general statistics as anyone would wish to know. The first book, covering fifty trees, brings together the information concerning them as it was printed in *American Forests*. It is a beautiful work, with photographs of the entire tree, and of leaves, fruit and bark, and in some cases flowers. There is also a map with each species showing its natural range. Without question, this is a book that should be on every tree- and nature-lovers' shelf.

E. J. ALEXANDER.

Current Literature At a Glance*

By Virgene Kavanagh

Taxonomy. A new taxonomic journal, *Arquivos de Botanica do Estado do S. Paulo,* deals with the flora of Brazil and has excellent illustrations, many in color.

Sea Life. The *Journal of Marine Research,* Vol. I, No. 1, has been issued by the Sears Foundation for Marine Research, Bingham Oceanographic Laboratory, Yale University. While none of the articles in this number are botanical, the information might be of use in explaining the distribution of marine forms.

Apples. The use of trees without trunks has resulted in good apple production in the Northern Great Plains area, where winter killing almost prohibits the use of ordinary apple trees.—A. F. Yeager, North Dakota Agricultural Experimental Station, Fargo.

Mt. Ranier. A check list of plants in Mt. Ranier National Park with descriptions of those popularly called flowers appears in the mimeographed bulletin of the U. S. D. I. National Park Service, Vol. 24, No. 1-2, 1938.

Trees. The ten most interesting trees in America are (1) the Founder's Tree, the redwood which is the tallest living thing; (2) El Arbole del Tule, the cypress which is the oldest and largest in girth of any living thing; (3) the General Sherman Tree, the redwood containing the greatest volume of lumber; (4) the National Community Christmas Tree, a spruce on the lawn of the White House, (5) Mother's Day Tree, a white

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

birch planted at Reading, Pa.; (6) the Jefferson Pecans planted by George Washington at Mt. Vernon from seeds given him by Jefferson; (7) Old Utah, a wind-swept, gnarled juniper, the oldest one of its kind; (8) The Oak That Owns Itself, a white oak in Athens, Ga., with a deed to the land on which it stands; (9) an elm at Hamilton, Ontario, with an endowment fund for its care; (10) The Dueling Oak, a live oak considered the most beautiful tree in America.—Dr. Henry Clepper, *Trees,* Sept., 1938, a new magazine being published in Santa Monica, Calif.

Succulents. Descriptions and exceptionally good colored photographs of the blossoms of four species of succulents appear in *Blühende Kakteen und andere sukkulente Pflanzen* by Dr. Erich Werderman.

Teaching. Lack of uniformity seems to be the outstanding feature of botany teaching, according to the answers obtained to the questionnaire sent out by the Committee on the Teaching of Botany in American Colleges and Universities of the Botanical Society of America. The answers have been tabulated and summarized in bulletin form.

Beverage Plants. Wild plants from which beverages can or have been made are listed and described briefly by Lena Artz in *Claytonia* for July 1938. Teas may be made from leaves, roots, or flowers of several mints, from New Jersey tea, wintergreen, sassafras, spicebush, sweet goldenrod, and holly. Coffee substitutes include Kentucky coffee beans (not safe), chickory and dandelion roots, and asparagus berries dried. "Indian lemonade" may be prepared from the berries of some of the common sumacs.

Plant Tumors. In one of the two reprints received from Dr. Dontelio Kostoff, Institute of Genetics, U.S.S.R., Moscow, he reports the experimental production of heritable tumors in plants. These tumors may be useful in the study of the fundamental nature of genes as well as of cancerous growths.

Index. The December 1936 index number of *Biological Abstracts* has appeared.

New Mulch. Glass wool has many advantages as a winter mulch for some plants, particularly those that need light during their resting stages.—R. C. Allen in *Real Gardening,* October, 1938.

Plant Breeding. Sweden has long been recognized as a leading nation in methods of plant breeding. A review of the country's work appears in bulletin form as "Swedish Contributions to the Development of Plant Breeding." Stockholm, 1938.

Rose Gardens. The 1938-39 *Members' Handbook of the American Rose Society* lists rose gardens throughout the country which may be seen by members and also the public rose gardens of America.

Disease Control. Unusual methods of controlling plant diseases are discussed by Dr. Neil E. Stephens in the August number of *The Botanical Review.* Some of the methods mentioned are the use of impregnated wraps for fruits in storage, the use of oils and waxes on fruits, low temperature storage in chambers rich in carbon dioxide or ozone, heat treatments of seeds, bulbs, or even affected plant parts, aging of seeds, fermentation of pulpy fruits before removal of seeds, frequent alternation of soil acidity, and trenching to check soil fungi.

Insects in Color. Excellent colored illustrations of the common insect pests in various stages of their development and of the injured areas of the plants are included with methods for their control in Circulars No. 162-177 of the New York State Experiment Station.

Nectarines and Peaches. A romantic story is told in brief in a continued article, "The History and Cultivation of Peaches and Nectarines," which begins in the March *Journal of the Royal Horticultural Society.* Edward A. Bunyard, who presented the paper last year before the Society, follows these fruits from their origin in China through their introduction into other countries in many parts of the world. In the second installment he gives instructions for cultivation. In the same two numbers of the Journal H. R. Darlington reviews historic writings on the rose.

Notes, News, and Comment

Tree Conference. The first Eastern Shade Tree Conference will take place at The New York Botanical Garden Dec. 8 and 9 to discuss problems in tree care resulting from the tremendous damage caused by the hurricane of Sept. 21. The call for the meeting is being issued by Dr. William J. Robbins at the request of a committee composed of W. O. Filley of the Connecticut Agricultural Experiment Station; Dr. E. P. Felt of the Bartlett Tree Research Laboratories; and Dr. B. O. Dodge of the Garden. The meetings will be open to all who are interested in the cultivation and preserving of healthy trees.

National Academy. Dr. B. O. Dodge gave a paper before the National Academy of Sciences in October on "Further Experiments with the 'Dominant' Lethal, I, in *Neurospora.*" Dr. R. A. Harper also attended the meeting, which was held at Chapel Hill, N. C., with the University of North Carolina and Duke University as hosts.

Addresses. Dr. William J. Robbins spoke at the Journal Club of the department of genetics of the Carnegie Institution at Cold Spring Harbor, L. I., Oct. 6 on "Growth Substances for Plants" and before the New York Association of Biology Teachers, Oct. 21, on "Plant Hormones." On Oct. 15 Dr. Robbins went to Ithaca to attend a dinner for Dr. K. M. Wiegand, head of the botany department at Cornell University, in a 25-year anniversary celebration.

Visitor. Dr. Samuel J. Record of the School of Forestry at Yale University visited the Botanical Garden, Oct. 26.

Collaborator. Dr. Fred J. Seaver has recently been invited by Doctors P. Redaelli and R. Ciferri, of Italy, to become one of the fellow-directors or "collaboratores" of the newly established quarterly journal *Mycopathologia,* which is devoted to the human aspects of mycology —that is, to the fungi as agents of diseases in the human body.

Displays. The 3,000 plants of hardy chrysanthemums which comprised the Garden's outdoor display this year were in full bloom the last week in October and promised to remain in fine condition, barring killing frosts, well into November. The 72 varieties included a large number of the new Korean hybrids.

The dahlias prolonged their season with an unusually fine showing of brilliant and abundant bloom. They were still attracting many visitors during the early part of November.

The first indoor floral display for nearly two years was opened in Conservatory Range No. 1 the last of October, with a new entrance to the greenhouse near the western end of the chrysanthemum border. The display consisted chiefly of chrysanthemums and begonias, arranged beneath the banyan tree in House No. 4, and interspersed with orange trees whose fruit was just turning color. Since then the floral display has been extended into an adjoining house.

Vacation. During a vacation trip in October, Dr. A. B. Stout lectured on "Incompatibilities in the Reproduction of Flowering Plants" at Michigan State College, Oct. 11, and at Ohio State University, Oct. 25. He inspected the plantings of hybrid poplars made by the Dow Chemical Co. in the area about Midland, Mich., and also made observations on the distribution of wild species of grapes while traveling by automobile over 3,500 miles through parts of New Jersey, Pennsylvania, Michigan, Wisconsin, Ohio, Illinois, and West Virginia.

Honor. Dr. F. J. Seaver was recently elected an honorary member of the California Mycological Society.

Exhibits. Recent exhibits in the Museum Building have included a collection of photographs by Rutherford Platt and Fleda Griffith, spatter prints by Anna Gilman Hill, herbarium specimens of algae and flowering plants, and books, all assembled to show how plants have forms which may be adapted to art. Until Nov. 19 there will be a group of 37 paintings of orchids in watercolor made from plants collected in Central America and raised in her own greenhouse at Cold Spring Harbor, L. I., by Jane Davenport Harris. The Bronx Artists' Guild is having a show at the Garden beginning Nov. 20. On the mezzanine during the month of November there is a special exhibit of drug plants.

THE NEW YORK BOTANICAL GARDEN

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, semi-annual, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twentieth volume. Subscription price, $10 a volume (two years). Not offered in exchange. Free to members of the Garden.

Journal of The New York Botanical Garden, monthly, containing notes, news and non-technical articles. Subscription, $1 a year; single copies 10 cents. Free to members of the Garden. Now in its thirty-ninth volume.

Mycologia, bimonthly, illustrated in color and otherwise; devoted to fungi, including lichens, containing technical articles and news and notes of general interest. $6 a year; single copies $1.25 each. Now in its thirtieth volume. Twenty-four Year Index volume $3 in paper, $3.50 in fabrikoid.

Brittonia. A series of botanical papers. Subscription price, $5 a volume. Now in its second volume.

North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. Planned to be completed in 34 volumes, each to consist of four or more parts; 85 parts now issued. Subscription price, $1.50 per part; a limited number of separate parts will be sold for $2 each. Not offered in exchange.

Contributions from The New York Botanical Garden. A series of technical papers written by students or members of the staff, and reprinted from journals other than the above. Price, 25 cents each, $5 a volume. In the fourteenth volume.

Memoirs of The New York Botanical Garden. A collection of scientific papers. Volumes I-VII. Titles on request.

Direct all orders to The New York Botanical Garden, Bronx Park, New York, N. Y.

* * *

DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

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CAROL H. WOODWARD, Editor

DECEMBER, 1938

CONSERVATORY RANGE NO. 1 AS IT APPEARS AFTER REBUILDING
Cover Photograph by Eric J. Baker, courtesy Lord & Burnham Co.

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NINETEEN THIRTY-EIGHT

One of the most significant achievements of the year at The New York Botanical Garden has been the resumption of displays in Conservatory Range No. 1 as a result of the near completion of the remodeling which was begun in the spring of 1937.

With this as a climax, the year now passing may be said to have been horticulturally successful. Record numbers of people visited the Thompson Memorial Rock Garden, the perennial borders, and the iris display in the early summer. The annuals and the waterlilies, the summer's chief attractions, remained in flower until late November. The rose garden also bloomed throughout the season. The hardy asters, dahlias, and hardy chrysanthemums seemed to surpass all previous seasons with their fullness of bloom, even though somewhat damaged in the hurricane.

Through its displays the Garden accomplishes part of its purposes and serves many people: among them, those who come for the pleasure of viewing the fine plantings; those who have gardens of their own for which they are seeking ideas; and those who raise plants commercially and who come to study the novelties and the familiar plants which are being grown at the Garden.

As these people come to Bronx Park in ever greater numbers, they are learning more of other services of the Garden—the use of the library, the Saturday afternoon lectures, the horticultural courses, the publications, such as the Journal, the willingness of staff members to answer their questions, and the investigational program of the Garden.

Without an accurate record having been kept, there is good reason to believe that the Garden has reached a larger number of people in 1938 through its displays and its efforts toward giving information and education than in any previous year. It is anticipated that its services will continue to be used and their value increasingly appreciated.

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VOL. XXXIX DECEMBER, 1938 No. 468

Conservatory Range No. 1, Completely Remodeled, Is Re-opened

SINCE early November, visitors to Conservatory Range No. 1 have been able to see the new tropical rain-forest house which has just been completed, as well as two houses devoted to seasonal floral displays, and other features in the newly remodeled range of greenhouses.

The three houses devoted to cacti and to other succulents of the Old and New Worlds have been open to the public since last spring, but it was not until October that any other portion of the new building was ready to be seen. Even now, the plantings in most of the houses are incomplete—in fact, it will be some time before all of them are finished—but the doors are kept open so that people may readily pass from the west end of the range, where the succulents and flowering plants are shown, to the east end, with its tropical rain-forest house. In the new tropical fern house, which adjoins the rain-forest, 300 species of ferns are already planted out naturalistically on improvised banks, along a small stream, and around a pool. The benches around the walls remain to be planted later.

Economic plants of temperate and tropical regions, aroids, and decorative flowering plants of the tropics are among the special groups which are to be developed in the conservatory. New palms are occupying the domed house in the center.

The opening display of flowering plants consisted of several thousand pots of chrysanthemums, begonias, and many other types of plants, followed in mid-December by poinsettias and other subjects appropriate to the holiday season. The display will be continuous, changing as new plants come into flower, until late spring or early summer. The conservatory is open every day in the week from 10 a.m. to 4 p.m.

Some Chronicles In Grape History

By A. B. Stout

II.

The Golden Age of Grape History in Eastern America

The introduction of the ***Concord Grape*** and the production by deliberate hybridization of Dr. Valk's hybrid, ***Ada,*** and of ***Allen's Hybrid*** came at an opportune time to provide the final stage setting for the "golden age" of viticulture in eastern United States. It had become generally recognized that the European grapes were not suited for culture in this area. That plants have sexual means of reproduction which permits hybridizations had become rather common knowledge. That hybridizations had already played an important role in the development of many cultivated plants was being realized. That the best of the grapes in cultivation were chance hybrids was recognized. That hybrid grapes of merit could be obtained by deliberate breeding had been demonstrated in a manner that "awakened the slumbering hopes of the horticulturists of a continent" (Hedrick, The Grapes of New York, page 165).

There were three important developments during this period. (1) A large number of seedlings were obtained by hybridization and breeding, and the best of these were propagated as named clonal varieties. (2) Many of the new varieties were widely planted and thus there were the rigid and practical tests necessary for their evaluation. (3) The main areas most favorable for the commercial culture of these new grapes were determined by experience.

The growth of commercial viticulture. A survey of viticulture in eastern United States which was made in 1859 by E. M. Erskine [1] (summarized by Hedrick in The Grapes of New York) reported that there were about 7,000 acres of vineyards scattered throughout 22 of the 32 states. The most extensive acreage in any one locality was in the vicinity of Cincinnati where there were 2,000 acres of vineyards. Erskine did not mention grape growing in New York State, and at that date there were probably no more than 500 acres of vineyards in the entire state!

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[1] British Parliamentary Papers (Library of Congress) Vol. 30, 1859.

The rapid expansion during the "golden age" of viticulture in the northeastern states, including New York, was checked about 1880 largely because of the competition of grapes and wine from California where the culture of vinifera grapes has proved to be very successful. Grapes of some type are now grown in every state of the union, though less than 1,500 vines are reported for Wyoming and there are less than 7,000 vines in each of the states of Montana, North Dakota, and Maine. According to the latest published reports of the United States Department of Agriculture (Agricultural Statistics, 1937), the production of grapes in California in 1936 was 1,699,000 short tons and that for all other states was 179,790 short tons. There have been fluctuations in the annual production and in the prices of the fruit, with periods of sectional expansion and depression. Yet the total production in 1936 was almost the same as that in 1919, which seems to indicate that viticulture in the United States has, in general, been rather stable during the past twenty years.

The Present Status of Viticulture in New York

New York State now leads all other states except California in the extent of viticulture. About 50,000 acres of grapes (32½ million vines) are in culture in the state. Next in the order of importance the eleven leading states are Michigan (27,000 acres with 18¼ million vines), Ohio (17,650 acres), Pennsylvania (11,200 acres), Arkansas (7,400 acres), Missouri (6,600 acres), Illinois (3,200 acres), Kansas, Iowa, and Oklahoma (about 3,000 acres each), and Indiana and New Jersey (about 2,300 acres each). In all these states the so-called "bunch" American grapes of hybrid origin predominate. Commercial culture of grapes in New York is now centered in four areas: (1) The Chautauqua district bordering Lake Erie in which 24,000 acres are devoted almost exclusively to the ***Concord Grape.*** (2) The Finger Lakes district in which 15,000 acres are cultivated. Here the varieties rank as follows: ***Concord***, ***Catawba***, ***Delaware*** and ***Niagara.*** (3) The Hudson Valley district of 7,000 acres, of which 88% is ***Concord***, 6% is ***Delaware***, 2% is ***Niagara***, and 10% is of various other varieties. (4) The Niagara County district of about 2,000 acres of which 56% is ***Concord*** and 38% is ***Niagara.***

The most important factor involved in the culture of grapes is the length of the growing season. Less than 160 days in a growing season is unsuitable for many varieties of grapes. Even in the districts most favorable to viticulture late frosts in spring, cold temperatures at an early date in autumn and severe winters may greatly reduce the crops of fruit. The best of the grapes of today are not suited for wide culture throughout the area of New York State.

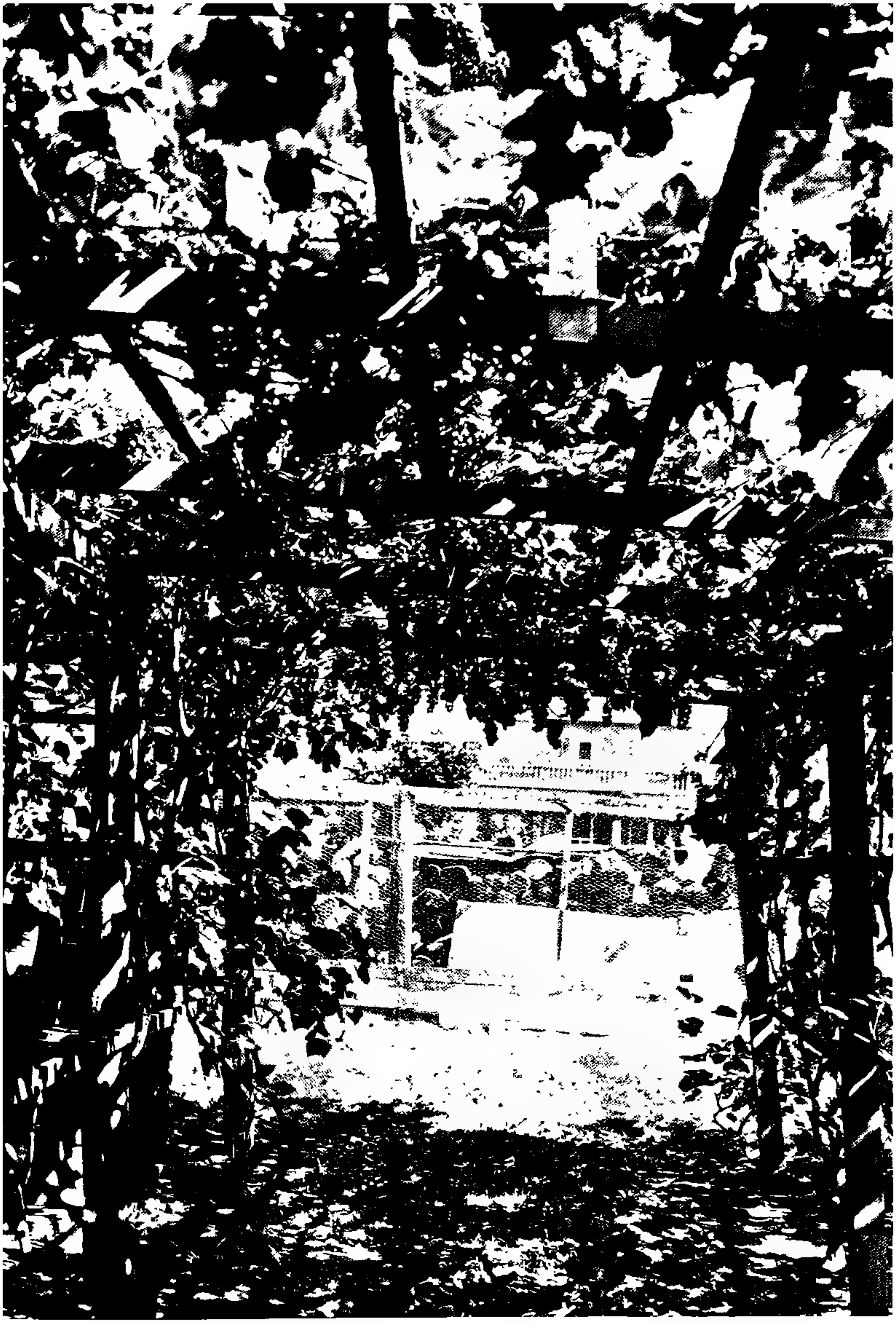
An Evaluation of Grape Breeding

The value of native wild species. Not until wild species were used in hybridization were grapes highly suitable for culture obtained. In The Grapes of New York Hedrick mentions by name about 1,400 horticultural clones of grapes that can be classed as "American." With the exception of a few clones all these grapes are of hybrid ancestry. Definite data regarding the parentage of many of these grapes are lacking but usually the ancestry of a clone is revealed by its characters or by the character of its offspring.

(1) The majority of the clones produced or grown in the northeastern states have at least some of the characters of the northern Fox grape, *V. Labrusca.* At least 30 of the 200 best varieties are decidedly like plants of this species and some of these have been regarded as pure for this species. About 75 clones show both *V Labrusca* and *V. vinifera* qualities.

(2) The species *Vitis vulpina L.* (*V riparia* Michx.), the Riverbank or Frost grape, is more widely distributed than any other American species of grape. Its fruits are usually small, their flavor is decidedly acid but free of "foxiness," and the flesh is melting. It would seem that this species should be of value in hybridization but few clones thus derived are of value. The ***Worthington Grape***, of some importance in the early development of viticulture in America, and the ***Clinton Grape*** show characteristics of this species. About 15 of the more important named clones appear to be hybrids of *V. vulpina* and *V. Labrusca.* There appear to be few, if any, varieties that are obviously hybrids between *V. vulpina* and *V. vinifera.*

On the opposite page, an arbor of Concord grapes at a home in Westchester County, New York, showing how one can combine a pleasant garden spot with the production of good fruit.



But the species *V. vulpina* plays a very important part in European viticulture. When the grape root-louse (*Phylloxera*) was introduced inadvertently into France it spread rapidly and did such damage that the extensive grape industry of France faced ruin. Finally it was learned that *V. vulpina* is very resistant to this insect and that the more vigorous forms of this species make excellent rootstock for the grafting of viniferas; so by this method most grapes are now grown in France.

(3) The rather variable species *Vitis aestivalis* (the Summer or Pigeon grape) grows in thickets of uplands from southern New York to Florida and westward into Texas. The fruits are black, juicy, and rather tart; they make a wine of rich color. There are several botanical varieties of this wild species which differ in size and quality of the fruit. One horticultural defect of this species is that the cuttings root poorly. About 10 of the major varieties of American grapes are *V. Labrusca* x *V. aestivalis;* the ***Norton Grape,*** a leading wine grape for areas south of New York State, is of this parentage. About 35 clones have *V. Labrusca, V. aestivalis* and *V. vinifera* in their ancestry, and of these the ***Delaware Grape*** is to be noted as the best of the commercial grapes for quality of fruit.

The Pinewoods or Post Oak grape of Texas and adjacent states has been classed by some as *V. aestivalis* var. *Lincecumii* and by others as a distinct species. This grape was used in hybridization by T. V. Munson in the development of clonal varieties of grapes of the bunch type suitable for culture in the South. Munson devoted much time and effort to the study of the wild grapes of the Texas area and to the breeding and testing of grapes. It is said that he originated more varieties of hybrid grapes than any other person in the United States. In a volume of 252 pages published in 1909, Munson summarizes his life work with grapes. It may be noted that the best of Munson's grapes were usually complex hybrids which had in their ancestry more than two wild species.

(4) The species *Vitis candicans* and *V. rupestris* were, it is considered, involved in the parentage of a very few varieties.

(5) The Muscadine grape (*Vitis rotundifolia*) is the most valuable grape at the present time for culture in many sections of the South. The clusters of fruit have few berries which drop when ripe. The skin of the berries is tough, the flavor strongly

Photograph by Edward Steichen

New York grapes in baskets, ready for the market.

musky. The most important clones in cultivation have been derived from wild plants. Of these some, as the ***James Grape,*** have black fruit; others, as the ***Scuppernong,*** have greenish-white fruit.

This species and the still more southern *V. Munsoniana* are

very distinct from all other grapes in respect to several characters. Considerable effort is now being directed to breeding which involves the southern species. It is reported that hybrids have recently been obtained between *V. rotundifolia* and varieties of *V. vinifera* and also with several of the clones cultivated in the North, including ***Catawba, Delaware, Concord, Winchell*** and ***Campbell Early.*** Some of these hybrids have the sterility characteristics of hybridity and are hence unfruitful; others are of no value; but some of the selections are now being studied for possible value in further breeding.

The present extent of grape breeding. All over the world activity in producing new types of grapes is much greater today than at any previous date. In the Old World grape breeding is in progress in France, Germany, Italy, the Union of Soviet Socialist Republics, and in Australia. In the United States breeding of grapes is now being done at State Agricultural Experiment Stations in California, Georgia, Maryland, Minnesota, Missouri, New York, South Dakota, Texas, and Virginia, and the Bureau of Plant Industry is conducting grape breeding at Beltsville in Maryland, at Fresno in California, at Meridan in Mississippi and at Willard in North Carolina.

An extensive program in grape breeding and comprehensive studies of the problems of viticulture have been in progress at the State Experiment Station at Geneva, N. Y., since 1892. Various new grapes of promise, as ***Seneca, Sheridan, Ontario, Portland, Fredonia, Westfield,*** and ***Golden Muscat*** have been produced. The breeding for the development of hardy seedless grapes has been a special project in which the writer has co-operated since 1919.

In general the methods in breeding grapes include selective breeding within the grapes already in cultivation, studies of native wild species, and further hybridizations. The aims are to develop grapes of quality that are fully hardy in the more northern regions, more resistant to diseases, and better, at least for certain regions, than are the varieties of the present time.

A century of grape breeding. Almost a hundred years have now elapsed since there was the first deliberate control of both the pollen parent and the seed parent in the breeding of grapes. The main effort has been to combine the productiveness and the

excellent quality of fruit possessed by vinifera grapes with the hardiness of native species. Many hybrids that are excellent in some one or more features, and especially in quality of fruit, are poor in growth, erratic in fruiting and limited in the range in which they grow well. It has not been a simple matter to combine the excellent qualities of the fruit of the vinifera grapes with the most desirable characters of the native grapes. It is also to be noted that no native grape is well suited for cultivation widely under diverse conditions, and that the best of the clones now in commercial cultivation have some rather decided defects. There is still opportunity for the development of better grapes.

Winter Lectures at the Garden

THE winter series of free Saturday afternoon lectures in the Museum Building at the Botanical Garden started Dec. 3 with an address by Dr. A. C. Smith describing his South American collecting expedition of 1929. In the spring he will give a talk on his trip of last year into British Guiana. The complete schedule of winter lectures is given below:

Dec. 3 ***From the Andes Down the Amazon***
A. C. Smith, Associate Curator

Dec. 10 ***Indian Food, Drink and Drug Plants***
G. L. Wittrock, Docent

Dec. 17 ***Garden Books for Gifts***
Elizabeth C. Hall, Librarian

Jan. 7 ***Bamboo—The Universal Provider***
W. M. Porterfield, U. S. Soil Conservation Service

Jan. 14 ***A Naturalist in Florida***
Harold N. Moldenke, Associate Curator

Jan. 21 ***Bermuda—Its Scenery and Gardens***
Fred J. Seaver, Curator

Jan. 28 ***New Autumn Chrysanthemums***
Alexander Cumming, Bristol Nurseries

Feb. 4 ***Gardening with Native Plants***
Robert S. Lemmon, Editor, "Real Gardening"

Feb. 11 ***Some Chronicles in Grape History***
A. B. Stout, Curator of Education and Laboratories

Feb. 18 ***The Role of Shrubs in Planting***
Henry F. Downer, Vassar College

Feb. 25 ***Spring Cleaning in the Garden***
B. O. Dodge, Plant Pathologist

Bamboo As It Is Grown For Food In China

By W. M. Porterfield

(*No. 5 of a series on Chinese Vegetable Foods in New York*)

BAMBOO as such needs no formal introduction, for its general appearance and the numberless uses to which it is put are known to nearly everyone. Its role as a vegetable food product is an important one among the Chinese.

Roughly speaking, bamboos, which include several genera of the Grass family, may occur in any one of three habits: (1) the clump-forming habit, in which the canes are bunched together; (2) the running habit in which the canes spread out over the ground in all directions, and (3) the climbing and vine-like habit, which is not considered here as it is not important to the present discussion.

The clump bamboos such as *Bambusa* and *Dendrocalamus* are mostly tropical, while the spreading type (*Phyllostachys* and some species of *Arundinaria*) push up into the subtropic and temperate zones. In the clump bamboos the younger canes spring from the buds at the base of the older ones, while the canes of the spreading type grow from buds at the nodes of a solid horizontal underground stem or rhizome. It is these buds just after their conical points begin to appear above the ground that are used for food. In China and in other countries where bamboos grow the shoots of many varieties are considered delicacies. Robert Fortune[1] found them being eaten generally and Montigny[2] who accompanied the French embassy to China in 1843 was responsible for sending the edible bamboo *Phyllostachys mitis* to Algiers where it is now established. Foreigners in China regularly have them served at their tables in season as a vegetable sliced and creamed, and they are delicious. Fresh bamboo shoots are not only boiled but may be preserved in pickle. Now, canned bamboo shoots may be bought. For transportation bamboo shoots may be kept fresh by packing them in mud, but for long-distance shipping they are

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[1] Fortune, R. A residence among the Chinese. p. 278. 1857. Also Bretschneider, E. History of early botanical discoveries in China. pp. 513-516. 1898.

[2] Bretschneider, E. loc. cit. p. 537.

A can of bamboo shoots and its contents, purchased in a Chinese grocery shop in New York.

dried. Of this I shall speak later. In Chinatown only dried and canned bamboo shoots can be bought. In East China and in Japan *Phyllostachys edulis* Lehaie, *P bambusoides* Sieb. & Zucc. (*P. Quilioi* A. & C. Riv.) and *P. mitis* A. & C. Riv. are the species which furnish the best shoots, the first being the largest and the third mentioned producing the tenderest, most delicate-tasting shoots. In the south of China[3] the shoots of *Bambusa arundinacea* Retz. and *B. vulgaris* Schrad. are eaten.

In order to prepare them for food the sheaths must first be removed, then the tender inner part variously cut lengthwise or crosswise into pieces. They should then be boiled in salted water about 30 minutes or more until tender. They never become mealy like a potato but remain firm and crisp. For three early recipes for cooking bamboo shoots let me refer the reader to Fairchild's brochure on "Japanese Bamboos" (U. S. D. A., Bureau of Plant Industry, Bulletin 43, p. 25. 1903), and to Galloway's on "Bamboos: Their Culture and Uses in the United States" (U. S. D. A., Bureau of Plant Industry, Bulletin 1329, p. 21. 1925).

[3] Wilson, E. H. A naturalist in western China. II. p. 62. 1913.

For the more elaborate recipes the Chinese Cook Book compiled by Mr. M. Sing Au (1936) and published by the Culinary Arts Press in Reading, Pa., and similar publications should be consulted. These may be obtained in the book department of the large department stores in New York and Newark. It is said that when Fortune was in China he was in the habit of eating bamboo shoots as a vegetable almost every day, sometimes boiled by themselves, at other times used in soup; and on one occasion Mr. Forbes, the United States Consul in China, taught him to make an excellent omelette with bamboo shoots included.

Chekiang province, like Fukien, Szechuan, and other bamboo-producing provinces in China, is noted for the production of dried bamboo shoots. Most of the inhabitants, especially in the Tienmushan district of Chekiang,[4] make their living by making dried bamboo shoots. The source of material is divided into three classes, the "early" shoots, the "rock" shoots and the "red" shoots. The fresh shoots are dug out of the ground, washed in clean water after the sheath-leaves are stripped off, and boiled in a big kettle filled with salt water. For every 200 catties (1 catty = 1⅓ lbs.) of shoots, six catties of salt are required. After two hours' boiling the shoots are taken out of the kettle and placed in a closed chamber where they are dried over a steady fire for about four hours. The partially dried shoots are then taken out of the oven and rolled between the hands, after which they are pounded flat with a hammer. In the south and elsewhere the shoots are also sliced lengthwise and dried as shown in the photograph. Once more they are put back in the oven and dried for about one and a half hours. When the drying process is finished they are taken out, placed on a table, and graded according to the degree of tenderness. They are then packed in baskets for the market. The entire process lasts about two days. From 200 catties of fresh shoots only 20 catties of dried shoots are obtained because of the high water content.

The business of making the dried shoots is carried on by many small workshops, the working period lasting about two months. A large workshop will put out about 100 piculs (1 picul = 133⅓ lbs.) and a small one 3 to 4 piculs. The number of workmen is four to sixty and their wages vary with the kind of work. There are two chief kinds of workers, namely, "driers" who do the

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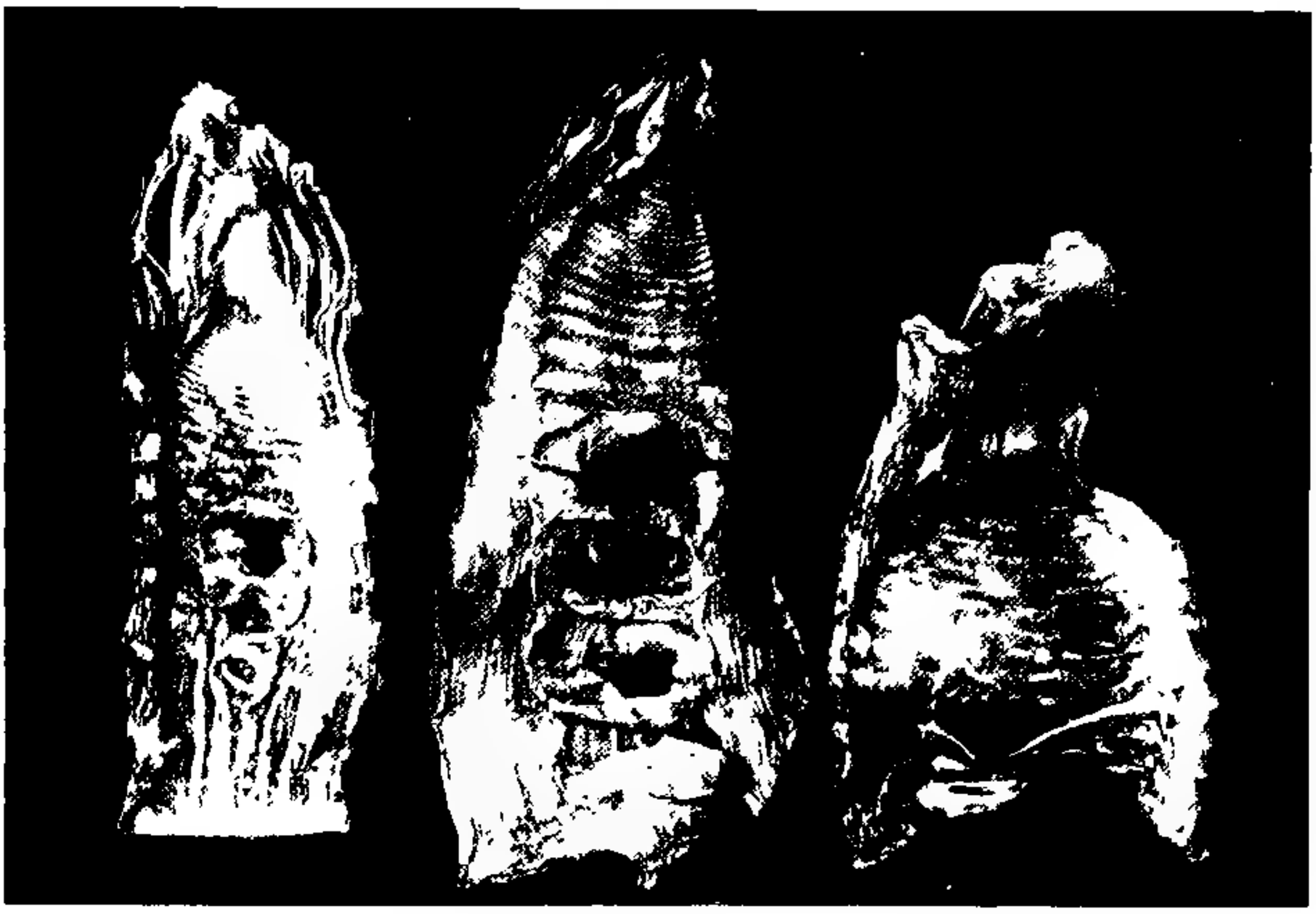
[4] Chinese Economic Bulletin. **16**: 315-317. 1930.

inside work and the "diggers" who are engaged on the "bamboo hills" to dig the shoots, wash them, take off the sheath-leaves, etc. Both are given free board and lodging, but the "drier" receives two Chinese dollars per picul (valued at about one-third of an American dollar); the digger about 50 cents. An experienced hand can earn at this rate 50 to 60 Chinese dollars a month. The dried bamboo shoots passing out of the Tienmushan district of



Sliced, dried bamboo shoots as sold in the Chinese food shops.

Chekiang province through Yuhang, the collection place, amount to about 300,000 Chinese dollars per annum. Sixty percent of the total output goes to Kiangsu province which lies to the east and in which the port city of Shanghai is located. About 30 percent is shipped to Tientsin, Peiping and Mukden, while the remaining 10 percent goes to Hongkong, Singapore and southern ports.

According to one authority[5] on bamboo growing in China, from an eight-year-old plantation forty pounds of shoots per mow (one mow = 7,260 sq. ft., or 1/6 of an acre) can be cut annually.

A bamboo grove which is cultivated for its shoots must not be allowed to age. On the other hand, too many of the shoots must

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[5] Meyer, H. F. and Ekelund, B. Tests on the mechanical properties of bamboo. The Engineering Society of China, 22 (paper no. 7): p. 5. 1923.

not be cut since this will affect the general vigor of the plant and all the shoots will tend to remain small and of inferior quality. Since a grove may be but one plant in which the canes are connected by an extensively interlaced system of horizontal underground stems or rhizomes, the rules of careful pruning must be observed. All canes are dated. On coming up from the ground the most vigorous shoots are left to grow and carry on the life of the plant while the younger shoots (those from the younger parts of the rhizome), because they are likely to be more tender, are culled for sale either fresh or dried. No cane is allowed to

Bamboo shoots as they come up from the ground. This photograph, taken near Hangchow, in Chekiang Province, China, shows Phyllostachys bambusoides, which is widely grown there for the trade.

stand longer than from five to ten years, and each year approximately the same number of canes will be cut in the fall as there were shoots left to grow in the spring. In order to divert the strength of the grove into shoot production, the tops of the canes are cut back from twelve to twenty feet from the ground. Fresh soil, creek mud, and manure are applied in the winter so that the entire "floor" of the grove is literally raised three or four inches. This insures proper nourishment for the roots and protects the shoots as they come up through the soil so that they will be

tender and succulent. It is the practice in some parts of east China to put inverted buckets and baskets over the places where the points of the shoots are just beginning to be visible through the soil. Exposure to light will make them bitter, therefore they are kept in the dark until cut.

While I have not heard this particular belief expressed by the Chinese there is in British India a saying that the bamboos will not put up their shoots until the thunder comes. Kurz[6] cites an incident told by a certain Captain W. H. Sleeman. In the rains of 1835 the Captain discovered that his bamboos at Jubbalpore had not produced their shoots at what he considered the usual time, so he asked his gardener the cause. He replied, "We have had no thunder yet; as soon as the thunder comes you will get shoots." The Captain inquired what possible connection there could be between claps of thunder and the shooting of bamboos. "God only knows," said the gardener, "but we know that until the thunder comes, the bamboos never shoot well." The thunder came and certainly the gardener's theory seemed confirmed for the bamboos began and continued to produce abundant shoots.

In Japan, according to Sir Ernest Satow's account,[7] fixed rules have been applied to the cultivation and harvesting of bamboo shoots. The Japanese Encyclopaedia informs us that a bamboo plant may be of either sex, and that the sex can be detected from the first branch it puts forth. Those whose branches grow in pairs are supposed to be female. Moreover, we learn that both the production and consumption of bamboo shoots are like compounding and administering medicine. Fixed rules must be observed; otherwise the shoots may be harmful. While digging them up wind and sun should be avoided, for if they are exposed to the sun, the core becomes hard. If they are cut with a knife while yet raw, they lose their tenderness. They must be boiled a long time, for eaten raw they are decidedly unwholesome. Such as have an irritating taste are bad for the throat and they must be thoroughly boiled with wood ashes over and over again to remove this irritating quality.

Bamboo shoots are good food. In a series of experiments carried out in collaboration with Dr. Eugene Peck in China, but unpublished, we definitely established the fact that fresh bamboo

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[6] "Bamboo and its Use". p. 32. 1876.
[7] The Cultivation of Bamboos in Japan. p. 16. 1899.

shoots contain vitamin C. They are known also to have a fuel value of 185 calories per pound. A gross analysis puts their water content at 90 percent; they also contain 3.2 percent protein, 0.2 percent fat, 6.2 percent carbohydrate, and 0.4 percent ash.

One interesting and final point in regard to the shoots of bamboos: most bamboos flower very rarely and only after 15, 30, 35, or 60 years, according to the species. Since bamboo is a grass, but a tree-grass, the flowers are like oats, rye, barley, etc., when they appear. However, since the flowers are rare, it is difficult to identify a bamboo except by certain morphological characters. Takenouchi[8] in 1931 in an able paper analyzed these and before him Kurz[9] in 1876 suggested certain characters by which bamboos could be identified. My own observations have led me to agree with the suggestions made by these men that among other constant characters the shoots constitute dependable criteria for identifying species. The sheaths that envelope the shoot are very characteristic as regards texture, surface, color, markings, margin, and the form of pseudophyll, ligule, and auricles. A classification based on the sheath characters would, I believe, be very reliable.

[8] Takenouchi, Y. Systematisch-vergleichende Morphologie und Anatomie der Vegetations Organe der japanischen Bambus-Arten. Mem. Fac. Sci. and Agric. (Taihoku Imperial University) 3: 1-60. 1931.

[9] Kurz, S. Bamboo and its Uses. Calcutta. 1876.

Water-Chestnuts Becoming Established

Referring to the third of Dr. W. M. Porterfield's articles on Chinese food plants in New York, Dr. Robert T. Morris of Stamford, Conn., writes to the Journal, saying that the water-chestnut, *Trapa,* would grow well in the stream at the foot of his lawn, excepting that muskrats and wild ducks eat it as eagerly as they eat the leaves of Nuttall's pondweed which he has tried to establish there. The water-chestnut, he remarks, is said to be established in the Merrimac River to such an extent that predators can not eat all of it. The species is presumably *T. natans,* which comes mainly from Europe and has become naturalized in Massachusetts, New York, and near Washington, D. C., though Dr. Morris speaks of the plant on his property as *Trapa bicornis,* the Asiatic species.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

"Come In and Learn About Life"

BIOLOGY—THE STORY OF LIVING THINGS. George William Hunter, Herbert Eugene Walter, George William Hunter, Jr. 670 pages, illustrated, indexed. American Book Company, New York. 1937. $3.75.

The binding or cover is the first impression which a new book leaves upon a student's mind, and frequently upon this impression, which is quite often profound, depends the degree of interest with which he enters into the volume's contents. Biology –The Story of Living Things is fortunate in this respect. The color of the binding is neither garish nor insipid; the title lettering is discreet, yet bold and legible; and the outline of the seedling on the cover is certainly distinctive. Really, this is a book that one would like to retain for one's own personal and permanent library.

Casual examination –a perusal of the contents, a hasty reading of the outline and preview of each chapter, and a brief study of the suggested reading lists—left me with a very favorable impression. A detailed and critical reading of the volume strengthened this impression into a reality of fact. I like this book—for several and quite definite reasons.

Briefly, these reasons are: First, the ecological approach—the natural and logical approach to the subject as well as an important phase of biological study which all too many authors of elementary biology texts have disposed of in a few, and quite frequently badly-placed, paragraphs; then the gradual and normal introduction and development of the other phases and facts of the subject. Second, the splendid chapter on evolution and the chapter on conservation—a matter which I believe should be presented in detail to every student. And, third, the roll call.

This fifty-five page roll call with its accompanying glossary of terms is, in itself, not only a textbook, but also an open door into the whole living world, and an individual invitation to each student to "Come in and learn about Life." The illustrations, accompanying the descriptive matter pertaining to each phylum or section, are well done and should stimulate student interest and inquiry. Rare, indeed, will be the student who will not find at least one of these illustrations intriguing.

The factual matter of the book is well presented, accurate, and not obscured by much-wordiness. On the whole, the illustrations are not only well chosen, but adequately and legibly labeled. Moreover, the questions which appear beneath most of the illustrations serve a double purpose—the stimulation of the student mind, and the correlation of illustration to text. The suggested readings are inclusive and reasonably contemporary, and, except in a few instances, definite chapters and pages are cited as applicable to supplement the preceding section of the text. There is a real year of study and a lifetime of investigation and contemplation between the covers of this volume.

Again considering the volume from the mechanical viewpoint, it is a pleasure to read. The type size and style are well chosen; the subheadings in boldface type –corresponding to the entries in the content outline of the chapters -prepare the reader for the content of the next several paragraphs; and italics, in the stressing of important facts and the isolation of terms and parts of the object under immediate study, have been neither misused nor overworked.

In closing this review of Biology--The Story of Living Things, I have only one more thing to say. I almost wish that I were a newcomer to the field of biological study, so that this grand book could be my first introduction to the subject and my first invitation to "Come in and learn about Life."

CHARLES GILLY.

Chromosomes in Simple Terms

THE CHROMOSOMES. M. J. D. White. 128 pages, 20 illustrations, glossary, index. Chemical Publishing Co., New York, 1937. $1.50.

This is a pocket-size volume which summarizes, evaluates and interprets the extensive researches on chromosome behavior in animals and plants. There are various diagrams, a glossary of terms, and a bibliography of 189 citations which give authority to the text. Students of biology will find this compact volume a model for a condensed and comprehensive treatment of the fundamentals of cytology in relation to reproduction, heredity and evolution.

A. B. STOUT.

A College Text and Manual

A TEXTBOOK OF GENERAL BIOLOGY. E. Grace White. 2nd edition, 667 pages, 336 illustrations, glossary, bibliography, index. C. V. Mosby & Co., St. Louis, 1937. $3.50.

Freshmen in many colleges are required to take a course in general biology; consequently, a fertile field is provided for writers of general biology texts for college students. The great number of texts that have been written vary little with respect to their subject-matter content. They differ widely in the manner in which the material is presented.

This text has been revised to include, in general, more subject matter. The botanical section especially has been amplified with new material on plant adaptation.

The book is divided into three sections. The first part, The Unity of Life, gives a rather detailed anatomical treatment of certain type forms: the grasshopper, a green plant, a paramecium, and some unicellular organisms. Included in this section are discussions of cellular organization, the physiology of the green plant, carbon, nitrogen, and sulphur cycles, and some ecological relationships. The second section, Problems of Biology, presents a treatment of biophysical and biochemical phenomena, vitamins, hormones, embryological development, heredity and some of the history of biology. The last section, Progressive Development, describes various types of plant and animal organizations. Many type organisms are described in detail. A separate chapter on animal adaptations is included in this section.

The text is co-ordinated with a companion laboratory manual which, together with classroom discussion and lecture work, are intended to give the beginning student a broad background for the study of biology. A desirable feature is the inclusion of both plant and animal organisms and relationships. The author states in the preface that the physiological material is discussed in the classroom and that the morphological material is handled in the laboratory. The initial intensive study of type forms is considered by some educators to be a desirable pedagogical procedure. The reviewer does not sympathize with this point of view. The language used throughout the book is simple, coherent and direct. Many illustrations serve to clarify the text. One feels that the topics within the book are arranged in too heterogeneous a fashion; no opportunity is provided for reflective thinking; no problems are asked; many of the aspects of modern biology are not mentioned at all.

The usefulness of the text depends to a great extent upon its correlation with other activities. If classroom work, lectures, and laboratory materials are adequate, the text should occupy a successful position in the learning pattern.

JEROME METZNER,
Department of Biology,
Morris High School.

New Plant Names by the Thousand To Tempt Rock Gardeners

THE PRESENT-DAY ROCK GARDEN; being a complementary volume to Farrer's English Rock Garden. Sampson Clay. 679 pages, illustrated with photographs, indexed. Thomas Nelson & Sons, New York. 1938. $12.50.

What with the going still far from smooth over Farrer's original clearing, here, in Dr. Clay's book, again as much ground has been broken. Those of us who do not mind the clod-hopping will derive from this a pleasant experience of room, but others, with a sense for smooth going, may regret that not more of this labor was expended in finish-grading the old patch. With the vocabulary of the original volumes in great need of overhauling from viewpoints of serviceable description, taxonomy, and nomenclature, we have here, instead, sev-

eral thousand new plant names introduced into horticultural usage, mostly without adequate descriptive or distinguishing data to enable us to employ them properly. What corrections and improvements have been made in the original are few, incidental, and of minor importance. Thorough revision, with modest extensions, might have been more useful in the cause of an orderly speech and literature of rock gardening. As it is, there has been much building upon shaky foundations. Frankly, we are bewildered by all these new names; the more so, since we have not yet learned to use intelligently so many hundreds of old familiar ones, all the way from Arabis to Yucca.

One cannot refrain from evaluating the usefulness of a compilation of this sort in relation to what appears to be the outstanding need in the field: better knowledge, with better information than is now readily available, as to which is which among the mounting thousands of listed sorts of rock garden plants. From this utilitarian viewpoint the book would seem to have a very limited usefulness, and one rather fears the effect of these thousands of new and undefined or poorly defined nomenclatural terms upon our rock garden lingo, already grievously confused.

In fact, this book does not impress one as a serious work of plant description. It is more nearly an attempt to estimate and comment upon the actual and probable desirability as rock garden plants of a multitude of new and little known things. In the absence of enlightening description, all this is of very limited worth. One appreciates the value of comment as an adjunct to good description, but hesitates to accept it as a substitute. One is left very much in the dark concerning many unfamiliar genera, listed without indication of the families to which they belong. For such as *Nolana* and *Nertera* one finally turns for information to the much more useful, if brief, text in Bailey's Hortus.

The present volume does not materially lessen the need of up-to-date revision, in instructive prose, of Farrer's rock garden flora. It is difficult to imagine an acceptable "complementary volume" without more revision and amplification than Dr. Clay has undertaken.

We are still far from having, in this field of "small plants," guidance at all comparable in quality with, may we say, Rehder's Manual in the realm of woody plants. Yet, that is the need: a competent work, well-furnished with botanical data and references, to steady our horticultural usage, by way of a firm structure for all manner of literary and popular side-shows to lean to. Such a job would be beyond the scope of any one individual. It might be a worthy project for a botanical institution. Be that as it may; the confusion in this field is so great that it behooves the compiler to assume this responsibility: not to drag additional names into horticultural usage without the clearest possible indication of what they mean in terms of plants. The need is for serviceable information concerning new names and for critical revision of data now available concerning a great many old familiar names. The need is for substantial data:—not for hazy comment on unknown and unelucidated subjects.

It would take exceptional literary merit, indeed, in so large a book as Clay's, to atone for a general lack of useful data. It is because of the rare gifts of beauty which he bore (more precious, perhaps, than any fruits of mere taxonomy) that the world has ever forgiven Farrer his shortcomings. Heaven send us more such sinners. But, lacking such gifts as his, they will be judged by the usefulness of their plant description and of their taxonomic and nomenclatural prose.

For demonstration of criticism here made, may we refer to the genus *Corydalis?* One major distinction, between tuberous- and fibrous-rooted kinds, has been omitted in many instances; as have, also, geographical origins. Frequent reference is made to *C. solida* and *C. cava*, both of which, in the original work, stand in need of elaboration and revision. Several sorts are likened to *C. solida* in a sweeping manner, without indication of peculiar merits or distinctions. For instance, *C. intermedia* (one of several listings of only remote gardening interest) might have been distinguished in as many words by the bract character. Handsome, white-flowered, Sicilian *C. densiflora* might have rated praise. Material commonly cultivated as such, or as var. *densiflora*, represents one or another

solida form from south of the Alps, related or belonging to *C. solida* Sw., var. *australis* Hausmann (*C. australis* in Farrer's inadequate text), a variety which, in cultivation, does not maintain its distinguishing floral character. Farrer gives it as 8 inches high, as against 16 inches (or less) for *C. solida*, while, in fact, this southern "australis" relationship averages taller than the more northerly *solida* forms.

Several of the Corydalis texts are so indistinctive that they would fit one sort as well as another.

From a viewpoint of mere nomenclature, one wonders if *C. Halleri* Willd. should not supersede *C. solida* Sw.

The best work in the book has been concentrated upon a small number of genera, including *Primula* and *Gentiana* and upon a selection of Andean plants which may prove to be of limited value in the greater part of the rock-gardening United States.

The illustrations are mostly very good, and of considerable interest. The spirit of the book goes out mainly toward the new and untried. Like Farrer's, it is essentially that of the explorer—not that of the systematic worker. Hence, perhaps, the interesting expression, in the introduction, of contempt for bibliographical, nomenclatural research as so much clerks' labor, unworthy of the scientific worker. Be that as it may, it will still be considered by many to have practical value. It is inseparable from a survey of the diagnostic history of the plants themselves, and a commendable aid to good compilation. It may not be pure science, but it is extremely useful in the cause of clear understanding. A little more of it in Dr. Clay's book might have smoothed over a few rough spots But rough spots will be found in the best of books, and one does not hold them particularly against this work.

Whatever other values of interest and stimulus the book may contain (and without denial of such values), we have here evaluated it frankly from the viewpoint of this extraneous question: To what extent does it serve the outstanding need in this field for information as to which is which among our thousands of rock garden plants?

P. J. VAN MELLE.

Herbs for the North

OLD-TIME HERBS FOR NORTHERN GARDENS. Minnie Watson Kamm. 256 pages, illustrated with drawings, indexed; 32 pages of photographs. Little, Brown & Company, Boston. 1938. $3.

Minnie Watson Kamm's book, Old-time Herbs for Northern Gardens, is very timely with the awakened interest in herb gardens. Excerpts from old herb books and literature telling of the uses of herbs in cooking and in the making of perfumes and medicines make this book delightful pick-up reading. The photographs of many of the described species which are included at the end of the book are a fine innovation. These pictures are well taken and give one an excellent idea of the characteristics of the plants illustrated. A complete bibliography would add interest for one who would like to delve more deeply into the study of herbs, and more explicit directions for their use in present-day cooking would be valuable to the housewife.

THEA M. GLEASON.

Viruses Brought Up-to-date

A TEXTBOOK OF PLANT VIRUS DISEASES. Kenneth M. Smith. 615 pages, illustrated with photographs and drawings; appendix, index. Blakiston, Philadelphia. 1937. $5.

In this book Smith presents briefly and clearly a rather complete account of the known plant viruses. Properties, methods of transmission, host ranges, and symptoms of diseases are described. The viruses are arranged in the order of their plant hosts, following Hutchinson's system of classification. The classification and naming of viruses are based on a scheme suggested by James Johnson, but Johnson's system and use of numbers are modified by substituting generic Latin names of host plants for English popular names. Smith's classification is doubtless as good as any previously used, but his adoption of new numbers in naming plant viruses will probably be considered regrettable by most plant pathologists.

A chapter on insects that transmit virus diseases and one on maladies suspected of being due to viruses add much to the value of the book. An appendix listing the most characteristic symptoms of various virus diseases on the more important host plants is a convenient aid in identifying diseases. Illustrations are,

on the whole, excellent. The book suitably supplements that entitled "Recent Advances in the Study of Plant Viruses," published by the same author in 1934.

L. O. KUNKEL,
Rockefeller Institute,
Princeton, N. J.

Curious Insects

THE BOOK OF INSECT ODDITIES. Raymond L. Ditmars, illustrated in color by Helene Carter. 63 pages, indexed. Lippincott, Philadelphia. 1938. $2.

Essentially a picture book, in which some of the curious insects of the world are shown in color against a map of the regions they inhabit, The Book of Insect Oddities is designed for younger readers whose interest in things of nature is just being awakened. For adults, magnification or exaggeration of the outstanding characteristics is not necessary when it comes to the subject of insect study. The color illustrations, though not totally accurate, are near enough for one to be able to recognize the insects represented, and they form the more appealing part of the book. Children, however, should find the short accounts educational and interesting, for outstanding facts about insects of a large portion of the world are mentioned in simple terms and numerous hints are given for further study.

RALPH PINKUS.

Biology, Cartoon Style

BIG FLEAS HAVE LITTLE FLEAS, OR WHO'S WHO AMONG THE PROTOZOA. Robert Hegner. 285 pages, illustrated with line drawings, photographs, and cartoons; glossary, bibliography, and index. Williams & Wilkins, Baltimore. 1938. $3.

The book might be entitled, "The other things that botanists get on collecting trips." It is such a fascinating account of the parasitic and commensal protozoa that this reviewer has had difficulty keeping the book long enough to review it. The teacher who complains that pupils never read anything that is not required had better not leave a copy on his desk if he expects to see it again before it is worn out. It is easy to read and the sketches of protozoa, the few photographs, and the amusing cartoons are excellent, yet it contains a vast amount of accurate protozoology.

With malaria far from eliminated in the United States, with amoebic dysentery on the increase, and with tropical diseases waiting on the Mexican border for the tourist, it would seem to be time to tell you and me and the rest of us about the protozoa. That it can be done so painlessly is gratifying. "Big Fleas have Little Fleas" should go on your "must read" list.

VIRGENE KAVANAGH.

Current Literature At a Glance*

By Virgene Kavanagh

N. L. Britton. Copies of the biographical memoir of N. L. Britton, prepared by Dr. E. D. Merrill and presented by him before the National Academy of Sciences in Washington at the annual meeting this year, have been received at the Garden. The 55-page booklet contains a 42-page bibliography of Dr. Britton's work prepared by Dr. J. H. Barnhart.

Rock Gardens. The 1938 Year-book of the American Rock Garden Society lists gardens open to members and enumerates books on rock gardening.

Chlorine. Geraniums and begonias are often killed or damaged by chlorinated water, and other greenhouse plants may suffer. The use of rain water for watering the plants is the only certain cure.—*Horticulture*, Nov. 1, 1938.

Blueberries. Several varieties of blueberries are valuable as ornamental shrubs because of their brilliant colors in autumn and their pleasing shapes in winter after the leaves have fallen.—*Horticulture*, Nov. 1, 1938.

Lincoln Garden. The Garden Club of Illinois, Inc., dedicated this fall an Abraham Lincoln Memorial Garden on the shore of Springfield Lake, southwest of the city of Springfield, Illinois. Native plants are being used throughout in a naturalistic planting scheme, which has

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* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

old farm-land, forest, the lake, and two small streams for a background. Individual garden clubs of the state are contributing special plantings, such as a meadow of shooting-stars, a Junberry lane, a bluebell trail, or a grove of sycamore. Most of the September issue of the club's magazine, *Garden Glories,* is devoted to a description of this great garden project.

Children's Books. A descriptive list of science books suitable for the elementary school library almost fills the *Cornell Rural School Leaflet* for September, 1938. Anyone interested in books for children would find the list useful.

Flushing. A list of trees which are historic landmarks in Flushing appears in Vol. 1, No. 1 of the little magazine, *Flushing*, October, 1938.

Useful Plant. Red clover, the state flower of Vermont, is probably the most valuable plant selected by any state as its symbol. *Madison Cooper's Gardening Magazine* for October, 1938.

Soil. "To Hold This Soil" is a fascinating account of land-saving devices that worked, in *Miscellaneous Publications* No. 321 of the U.S.D.A.

Algae. Several reprints dealing with the algae of the Americas have been received from Dr. William Randolph Taylor and from Dr. Frances Drouet.

Man vs. Virus. "Alice in Virusland" is the title of the interesting and not too profound presidential address delivered by Dr. Paul F. Clark before the Society of American Bacteriologists. Virus, coccus, spirochaete, and others of their clan weigh man in the balance before Judge Limulus and find him scarcely worth living.—*Journal of Bacteriology*, September, 1938.

In the Air. A study of micro-organisms in the upper air carried on since 1932 at the Massachusetts Institute of Technology shows bacteria and molds existing at 16,500 feet altitude. Six species have recently been recorded from that height nearly as many as have been found at 1,500 feet. Bernard E. Proctor and Basil W. Parker published results of investigations with an improved apparatus in the August *Journal of Bacteriology*.

Notes, News, and Comment

Board Member. Dr. E. C. Auchter of Washington, D. C., was elected Nov. 18 to the Board of Managers of The New York Botanical Garden in the class of 1941, to succeed Dr. L. H. Bailey of Ithaca, N. Y., who retired last January, shortly before his eightieth birthday, in order to have more time to devote to his scientific work.

Dr. Auchter, who is Chief of the Bureau of Plant Industry of the United States Department of Agriculture, has had an intense interest in horticulture from his earliest years. A graduate of Cornell in 1912, his first work was as Assistant Pomologist there. He received his doctor's degree there in 1923, and in 1928 became Chief Horticulturist with the Bureau of Plant Industry in Washington. In 1925 he was made Assistant Chief and this year Chief of the bureau. His principal interest is in orchard fruits, their breeding and culture.

Binding. Through arrangement with the bindery which handles the books for the Botanical Garden's library, readers of the Journal and of Addisonia this year may have their volumes bound at special rates. For a set of the 12 monthly issues of the Journal the price for binding is $1 plus postage. For a volume of Addisonia, consisting of four numbers, the price is $1.60 plus postage.

The binding will be of the highest standard, good quality, boards covered in full green cloth, lettered in genuine gold. *To have a volume bound, the entire set should be wrapped in corrugated boards and mailed directly to* Dess & Tallan Company, Inc., 217 East 144th St., New York City. The work will be promptly done and a bill will be sent before the bound volume is returned to the owner. Missing copies of the Journal will be supplied by the Garden at ten cents apiece. The entire set should be mailed to the bindery in one package. Missing copies of Addisonia can also be supplied at the regular price of $2.50.

Committee. T. H. Everett has been appointed to the exhibition committee of Hortus, Inc., the organization which has charge of the horticultural exhibits at the World's Fair. Through this committee he has been assigned to the schedule

committee, on which he will work with J. G. Esson on plant novelties to be exhibited.

Courses. The second term of the course in practical gardening and of the science course for professional gardeners will start shortly after the first of the year. Registration for each subject may take place either in advance or on the opening night between 7 and 7:45 p.m. The classes are held in the Museum Building.

The Cultivation of Greenhouse Plants will be the subject for the course in practical gardening, to commence Thursday evening, January 5. It will be given by Joseph Tansey, greenhouse foreman at the Garden, and will deal with the methods and problems involved in the culture of indoor plants. Besides instruction in the raising of such flowering plants as begonias, carnations, poinsettias, primulas, chrysanthemums, and bulbs, attention will be given to some novelties for greenhouse culture.

This subject will be followed in the spring by a laboratory course in indoor gardening, in which a number of greenhouse plants will be raised by the class.

Student gardeners and others taking the science course will enroll after the first of the year for classes in Plant Breeding under Dr. A. B. Stout and Economic Botany under G. L. Wittrock. The first lectures of the new term will be given on Monday evening, Jan. 9.

Carex. A bequest from the late Kenneth K. Mackenzie, for several years a member of the Garden's Board of Managers, included a set of carefully executed drawings of North American species of *Carex,* together with a sum of money for their publication.

The drawings illustrate in great detail every North American species of this great genus except four. These are now being illustrated by the original artist, and editorial work preliminary to publication is in progress. The drawings will be accompanied by botanical descriptions and other appropriate information, and will be published in large quarto form, probably in two volumes of about 540 pages each.

Forestry. Dr. A. B. Stout attended the 25th meeting of the Northeastern Forest Research Council at New Haven, Dec. 1 and 2. There were discussions and reports on such matters as timber salvage and forest restoration in relation to the damage done by the recent hurricane; the utilization of forest products, flood control, and the scope and progress of the work in forest genetics, in which Dr. Stout is a collaborator.

Lectures. E. J. Alexander gave an illustrated lecture on "Seed Collecting in the Rocky Mountains" before the department of botany of the Brooklyn Institute of Arts and Sciences at the Brooklyn Botanic Garden, Oct. 11, and before the botany students of Connecticut College, New London, Oct. 20. Dr. H. N. Moldenke lectured to the Summit (N. J.) Nature Club, Oct. 28, on "Treasures of the Watchung Hills."

Mycologist. Dr. Alexander Smith of the University of Michigan spent the Thanksgiving week-end at the Botanical Garden doing some mycological research. He was accompanied by Mrs. Smith, who is working in palaeobotany.

From Cuba. Dr. J. T. Roig y Mesa of the Agricultural Experiment Station in Havana, Cuba, spent several days at the Garden in November.

Other Visitors. Dr. Philip A. Munz of Pomona College, Claremont, Calif., specialist in western plants and in the Onagraceae, was at the Botanical Garden November 8. Among other visitors of the month were Arthur C. Pillsbury of Berkeley, Calif., famed for his development of slow-motion photographs of growing plants; Mary Elwes of Newbury, England, painter of gardens; Maxine Larisey of the Missouri Botanical Garden, who was doing some taxonomic work in the herbarium.

Lecture. "Our National Parks" was the subject of Dr. H. N. Moldenke in a lecture before the John Burroughs Garden and Community Club of Yonkers, November 2.

Conference. At the first fall conference of the scientific staff and registered students of the Garden, November 9, reports of summer scientific meetings were given by Doctors Robbins, Gleason, Dodge, Seaver, and Stout.

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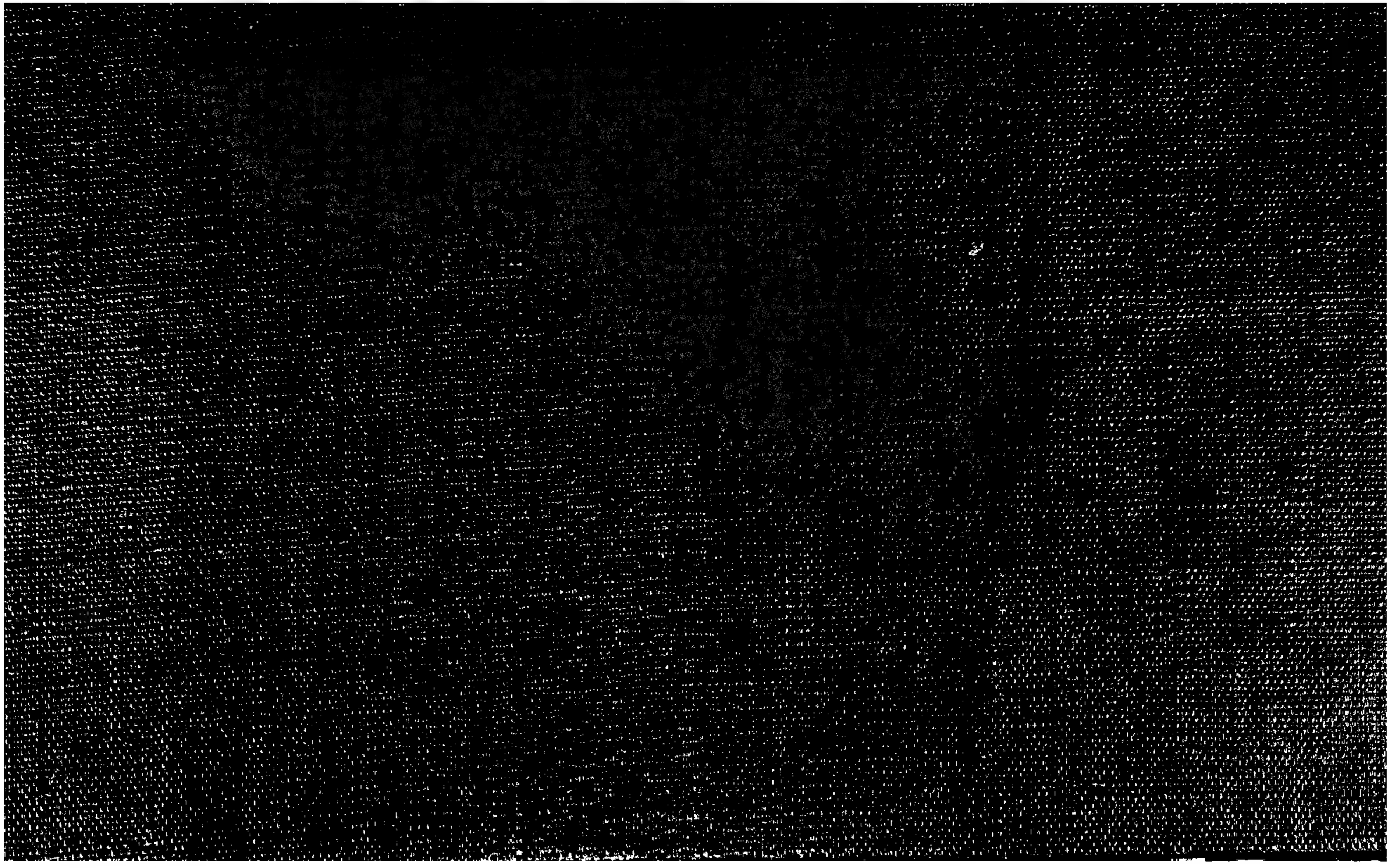

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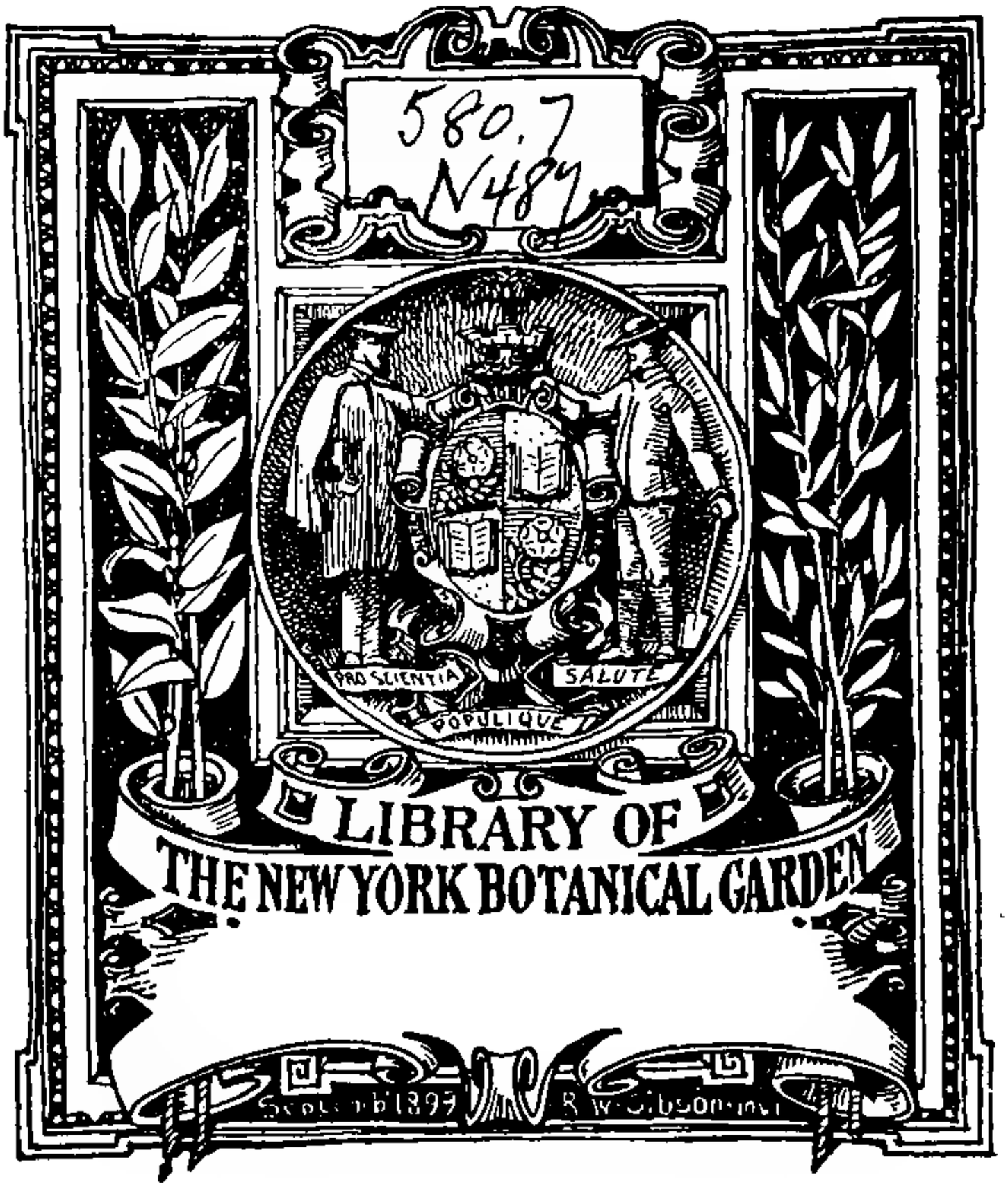
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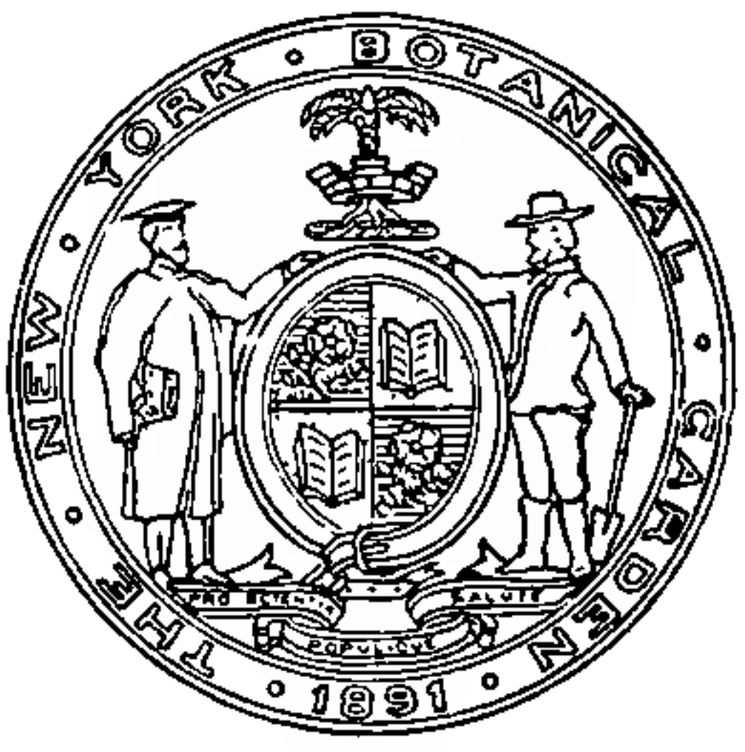
CAROL H. WOODWARD
EDITOR



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CAROL H. WOODWARD, Editor

JANUARY, 1939

LOOKING INTO THE CENTRAL DOME OF THE MAIN CONSERVATORY
Cover Photograph by Eric J. Baker, courtesy of Lord & Burnham Co.
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AFTER HALF A CENTURY

Fifty years ago, when the idea of a great botanical garden in New York City was first proposed, there was an enthusiasm among foresighted men which made it possible in a few short years to offer the public the pleasure of walking among well-cared-for gardens on spacious grounds, of observing shrubs and trees such as they had never seen before, and of visiting new conservatories where living plants from afar were brought before their marveling eyes. To the student and the scientist there was offered a new opportunity in America's greatest city to study living plants, to collect plants and place them in a safe and useful repository, and to study the collections of others in the herbarium, besides the opportunity of learning from an ever-growing library all that others had learned and recorded in the past about plant life.

The generosity of these men who made the establishment of The New York Botanical Garden possible is remembered today; the money which they gave is still being used for part of the institution's upkeep. Yet greatly increased resources are needed today, for there is planned for the future a program of ever-widening service a program which, if funds are provided for carrying it out, can mean as much in additional enlightenment and pleasure for the generation of today as the establishment of the Garden meant nearly two generations back.

Few of the early donors are here today. Many securities purchased with their gifts have meanwhile altered in value, and as the Garden has grown, its needs in serving the public have increased year by year. It is only by the strictest economy, almost unbelievably rigid, that the institution has been able to continue much of the work for which it was originally founded. Men who are in a position to be the successors of the founders have perhaps not had a chance to realize that maintenance costs increase as an institution progresses. It is easy for them to expect the work being done by The New York Botanical Garden to proceed on its own momentum.

The great need therefore today is for a new enthusiasm which, with appreciation for the purposes and the services of the Botanical Garden will provide the means for it to continue its program unhampered by the restraining effect of today's inadequate funds. For an example there are the magnanimous gifts for public service which were tendered fifty years ago.

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Discovery Of Circular Of 1889 Marks Fiftieth Anniversary Of Garden's Conception

A YELLOWED piece of paper which had spent many years in the back of a drawer in an old desk came to light recently just before the fiftieth anniversary of its publication in 1889.

Headed "Appeal for a Public Botanic Garden in New York City", the four-page circular, bordered in now faded bands of red, states: "At a regular meeting of the Torrey Botanical Club, held January 8, 1889, the subjoined appeal was unanimously adopted and ordered to be printed for general circulation." No name is signed, and there is doubt as to the author's identity, though it may have been E. E. Sterns or perhaps the leaflet was a composite piece of work.

In reviewing the life of Nathaniel Lord Britton in this Journal for August 1934, Dr. Marshall A. Howe recorded the story of how the idea of a great botanical garden in New York was first proposed to the Torrey Botanical Club.

"Dr. Britton himself," he wrote, "is authority for the statement that the beginnings of the history of The New York Botanical Garden may be traced to a remark made to him by Mrs. Britton in the summer of 1888, when they were on a visit to the Royal Botanic Gardens at Kew, England. Mrs. Britton, impressed by the beauty and scientific interest of the plant exhibits at Kew and by the importance of the Royal Gardens' numerous contributions to the literature of plant sciences said, in effect: 'Why couldn't we have something of this kind in New York?' At a meeting of the Torrey Botanical Club held on October 24, 1888, Mrs. Brit-

ton gave a description of the Royal Gardens at Kew. At the next meeting of the Club, a committee was appointed, consisting of E. E. Sterns, Arthur Hollick, Thomas Hogg, H. H. Rusby, T. F. Allen, N. L. Britton, J. S. Newberry, and Addison Brown, to consider the idea of establishing a botanical garden in the City of New York. At a meeting of the Club on January 8, 1889, an appeal for such a garden, prepared by the committee, was adopted and ordered printed."

Beginnings of the Garden

The eventual results of this appeal are evident today. Within two years The New York Botanical Garden was incorporated under the laws of New York State. Judge Addison Brown began the campaign for funds by contributing $25,000 toward the establishment of The New York Botanical Garden. This sum was matched by J. Pierpont Morgan, John D. Rockefeller, and D. O. Mills, as well as by Columbia College. With additional funds subscribed by William E. Dodge, J. A. Scrymser, William C. Schermerhorn, Hon. Charles P. Daly, Oswald Ottendorfer, Samuel Sloan, George J. Gould, Helen M. Gould, John S. Kennedy, William Rockefeller, Arnold-Constable & Co., Morris K. Jesup, Mrs. Melissa P. Dodge, Tiffany & Co., and Hugh N. Camp, the endowment reached $250,000 by June 1895. The following month the institution was granted the right to occupy a tract of 250 acres in an undeveloped portion of Bronx Park.

In recognition of the achievement of the endowment, the City provided $500,000, as required by the Legislature, and the work on the grounds and buildings commenced almost at once. The first half of one of the largest public greenhouses the world had ever seen was opened to the public in 1901. Meanwhile the museum, which was destined to house a herbarium and library of then undreamed-of magnitude, was started in 1898 and partially occupied late the following year. The pharmaceutical plants and their products, the need for which was especially mentioned in the Torrey Club's appeal, were assembled as part of the great collection of economic plants by Dr. Rusby. Trees and shrubs were planted outdoors and extensive gardens were developed. A modest appeal it was, yet it marked the beginning of an overwhelming response from patrons of horticulture and botany who foresaw the uses of a large botanical garden in the metropolis.

The text of the Torrey Club's appeal is given on the following pages.

The Appeal of Fifty Years Ago

The accumulation of wealth and the growth of public spirit in this metropolis make it reasonably certain that we shall have, sooner or later, a public botanic garden of the highest class. The sole question at present seems to be whether we shall have it very shortly, or wait another generation for its establishment.

Strictly speaking, a garden of this sort is a scientific and educational institution, quite as much so as a library or a college, and for its foundation and maintenance the public may properly look to the sources from which so many of our universities and libraries have been derived. A garden such as New York City ought to have, would fully equal in value such distinguished institutions as Cornell University, Vassar College, or the Astor and Lenox libraries. In a sense it would even surpass them in importance, for it would occupy an educational and scientific field at present very inadequately cultivated in this country.

Such a garden might be established and maintained by one man of wealth or by a corporation of citizens. An institution on the latter basis will naturally arise when several men of means shall have made plant collections too important to be lightly dispersed. One, let us say, will accumulate orchids, another palms, a third ferns, and a fourth liliaceous plants. These or similar collections, united by common consent, properly housed, and provided with a sufficient maintenance fund, would form the nucleus of an institution, essentially horticultural and popular in its inception, but susceptible, under wise direction, of ultimately attaining a high degree of scientific usefulness. A third method of securing a botanic garden would be by municipal appropriation and under municipal management. The city might, at least, afford valuable aid to the project by giving a site from the lands appropriated for park purposes; and an annual subsidy of fixed amount from the city (or State) treasury would also be an important assistance.

The uses of a botanic garden may be reckoned as of four sorts. First and foremost is the purely scientific and educational use. Subsidiary to this, but still of a marked degree of importance, are the pharmaceutical and horticultural uses, and, lastly, the general use as a place of agreeable resort for the public at large.

It is obvious that a considerable collection of living plants, arranged with scientific method and representing with tolerable completeness the various classes and orders of the vegetable kingdom, must be of immense interest and value to every practical botanist. Such a garden as New York might have would speedily become a Mecca for the botanists of America, and for those of the Old World also if due attention were paid, as it should be, to making the representation of distinctively American plants as full as possible. To students of botany in the numerous schools and colleges within a hundred miles of us, such a garden would be of the greatest benefit. Courses of instruction, vividly illustrated by living specimens, could be provided for pupils from New York and its vicinity, and thus a great and desirable impetus might be given to the pursuit of one of the most useful and interesting of sciences.

Students in medicine and pharmacy approach the subject of botany with a particular object in view. Plants of medicinal value have for them a special importance. With ample means at command it would be easy to obtain an abundant representation of plants of this nature, without prejudice to the purely scientific character of the garden, thus securing for the institution the highest degree of pharmaceutic usefulness, and making it an invaluable auxiliary to our admirable medical schools.

The horticultural uses of a great botanic garden are more or less indirect, and yet of the utmost consequence to all practical gardeners. The hot-houses of such an institution should be models of construction and management; the methods of cultivation should be the best that science and experience can dictate; the director and his deputies should be men of the highest ability in their calling. It follows, therefore, that such a garden becomes, of necessity, a sort of College of Horticulture, service in which for a reasonable term would be the best possible preparation for practising the gardener's art. Moreover, the primary object of a botanic garden includes the introduction and cultivation of new and untried plants, and consequently the florist would find gathered there a multitude of rare species, many of which might prove desirable for ornamental cultivation.

The remaining use of a botanic garden, as a place of agreeable and profitable resort for the general public, is by no means to be lightly estimated. The large attendance at our orchid and chrysanthemum shows, the curiosity excited by the rare plants cultivated for some seasons past in Union Square by the park authorities, the increased interest given to Central Park by the attachment of name-plates to many of the trees—these circumstances combine to prove beyond a doubt that the public at large would keenly appreciate a public garden where, thanks to systematic grouping and a liberal use of labels, a considerable acquaintance with plants might be readily and pleasantly acquired. It is aside from the true purpose of a botanic garden to give any preference to merely ornamental plants, or to aim at any of the showy effects which are legitimate and desirable in parks and pleasure-grounds; but Nature abounds in rare and remarkable trees and herbs, wholly proper for such a garden, and admirably calculated to excite a lively interest in even the most indifferent visitor.

To serve adequately the various uses here indicated a botanic garden requires a somewhat spacious site. The Royal Botanic Garden at Kew comprises sixty-seven acres, an area ample for its purposes. Fifty acres might be considered a reasonable amount of land for a New York botanic garden; half as much could be made to answer a good purpose; seventy-five acres would be none too much for its ultimate highest development. Several available sites might be set off from the outlying park lands recently acquired by the city. Apart from these it is doubtful if sufficient ground could be secured within the city limits except at most exorbitant cost. It might, therefore, be found wisest to establish the garden somewhere in the suburbs, special care being taken to select a place easily accessible at all seasons of the year. The question of site, however, is secondary to the question of funds, and can be readily solved whenever the money is forthcoming.

More than one of our wealthy citizens enjoys public repute as a generous patron of horticulture. Scarcely any are wholly indifferent to it. Surely the scheme of a public botanic garden should commend itself to all. Two American institutions of kindred nature—the Shaw Garden at St. Louis and the Arnold Arboretum at Brookline, Mass.—are already in successful operation, honorably perpetuating the names of their respective originators, and benefiting at once the student and the general public. These are modest affairs, remotely and inconspicuously situated; but a botanic garden of the highest class, established in New York City or its immediate neighborhood, would be placed at the best imaginable point to win a lasting reputation for itself and its founder, both in this country and abroad.

Sturdier, Healthier Trees The Aim Of Eastern Conference At Botanical Garden

By Carol H. Woodward

REPEATING their conviction that tree planting must go on, but declaring that sturdier trees must be used in the future and that vigorous efforts must be made to keep fungous and insect troubles in check, twenty-six experts on trees addressed the Eastern Shade Tree Conference at The New York Botanical Garden December 8 and 9.

The meeting, which was attended by about 200 persons, was called by Dr. William J. Robbins at the request of a committee consisting of W. O. Filley, Forester at the Connecticut Agricultural Experiment Station; Dr. E. P Felt, Director and Chief Entomologist of the Bartlett Tree Research Laboratories; and Dr. B. O. Dodge, Plant Pathologist at the Garden. Mr. Filley served as chairman of the conference, the purpose of which, as announced in the program, was to present a "broad discussion of hurricane damage to shade trees, with special reference to rehabilitation and related problems." It was an emergency conference, called because of the damage suffered by trees in New York and the New England states during the hurricane of September 21. Although no permanent organization was formed, the proceedings will be published and distributed at cost. It is planned to publish in the pages of this Journal excerpts from several of the papers.

While the hurricane's toll of a million or more good trees with inestimable damage to many millions more was greatly deplored, the speakers admitted that the tropical storm had left in its wake some useful lessons. Dr. D. T. MacDougal, who has spent years in the study of the physiological systems of trees, even hailed the uprooting of lordly trees as a boon to science, because of the opportunity it offered for the study of roots without deliberately digging up healthy mature specimens. A paper by Dr. MacDougal, who has recently retired from his post with the Desert Laboratory of the Carnegie Institution at Tucson, was read at the meeting by Dr. Robbins.

Allyn R. Jennings, General Superintendent of Parks in New York City, and Carl Bannwart, Superintendent of the Newark Shade Tree Bureau, both emphasized the fact that the damage would have been less if in the past large numbers of poplars and silver maples had not been planted in the two cities by property

owners. In New York there is now a law against the planting of these two trees, because their brittleness makes them susceptible to the wind and consequently makes them hazards along the street.

Emphasis was placed by a number of speakers on the need for continued planting but at the same time for the selection of only those trees which are best suited for the purpose.

"The show must go on, come what may," said John L. Wright, State Director of Roadside Development in Connecticut, "if this generation is to pass on to future generations their just heritage of tree-lined roads." While the tree crews of the Connecticut highway department are now, he said, concentrating all effort on repairing the trees worth saving, a shade-tree planting program will be carried on as rapidly as funds permit. Connecticut has apparently been doing some outstanding work in the provision of shade trees for country highways and city streets. From New Haven, which has the country's oldest bureau exclusively devoted to shade-tree care, Fred S. Eaton, City Forester, brought the news of a new variety of linden which the city is propagating because it does not shed its leaves in midsummer or become unsightly from red-spider attacks; of plane-trees which, the bureau hopes, will not frost-crack or winter-kill; of an elm "better than *Ulmus pumila*" bearing dense, deep green foliage which is unattractive to aphids and elm-leaf beetles but most attractive to the human eye from the time the leaves appear in very early spring until they fall at Thanksgiving time; of a good Chinese hackberry; several lesser known oaks; a new cork-tree (*Phellodendron*); and of a grafted, double-flowering horsechestnut. It is with these new, tested trees that New Haven will replant its streets as rapidly as finances and the exigencies of propagation permit.

Dr. Arthur H. Graves of the Brooklyn Botanic Garden, who has done extensive breeding of chestnuts in an effort to develop a form that will be resistant to the chestnut blight, told of this and of other work being done toward the improvement of tree varieties. He spoke especially of attempts being made in the Netherlands to produce a European elm which would be resistant to the Dutch elm disease. One, named "Christine Buisman", is now being multiplied and its progeny are being tested.

The sooner we start to work in this country, the better, Dr. Graves said, recommending that a disease-resistant species like *Ulmus pumila*, the Siberian elm, should be crossed with the American elm. "The object in view should be, in my opinion," he stated, "to produce an elm of large size and beautiful vase-like outline, like our cherished American species, and at the same time resistant to the Dutch elm disease."

Wherever there were sugar maples there was hurricane damage which will have a severe economic effect. H. L. Bailey, Entomologist with the Vermont Department of Agriculture, reported 20 percent of the sugar maples in his state damaged, and M. A. Mackenzie of Massachusetts State College told of a great loss of sugar maples also in his state. Mr. Bailey pointed out that in Vermont the sugar maple is the tree most seriously affected by the forest tent caterpillar, which in different regions feeds on a variety of species.

Fallen maple trees, he said, will give the larvae a chance to hatch and eventually infest the remaining standing trees. Increased vigilance will be needed next summer in watching for egg masses, spraying wherever caterpillars have hatched, and burning all brush from fallen trees without delay.

The question of increased insect injury to trees as a direct result of the hurricane occupied a large portion of the conference. One entire morning was devoted to papers on the Dutch elm disease in the eastern states, and the Japanese beetle, gypsy moth, European spruce sawfly and the European pine-shoot moth were among other entomological problems discussed. While insect injury was held to be a frequent cause of storm damage, because of its weakening effect, the greatest danger to trees, the speakers indicated, lay in the expected increase of insect pests on trees, with a consequent increase also in devitalizing or fatal fungous diseases. The broken limbs, the strained and weakened trunks, the defoliation by wind when that occurred, the fallen debris, and standing stumps are all an invitation to insects to come and feed and build their homes and create their millions of young, which will go out and infect the healthy trees.

Proper feeding and care to enable trees to develop more adequate root systems for their support was another factor considered of major importance by the tree experts.

"Neglect of this may be costly," said Dr. Felt. "A recently published item stated that $100,000 is needed to repair sidewalks broken by uprooted trees in Queens County, New York. It is well known that deep rootage is impossible in a shallow soil, on rock, and in a soil where the water table or a heavy clay or hardpan is near the surface. The obvious thing is to recognize these conditions and use low-growing trees in such areas, or head them back to offset to some extent the manifest root limitations. It is known that the roots of most trees reach out after plant food, and even in areas where deep rootage is impossible, it is believed that judicious feeding may result in a material expansion of the root system, thus giving the trees a firmer hold upon the soil."

The generally inadequate development of roots beneath pavement was pointed out during the discussions.

"Healthy trees and therefore strong trees can be secured," Dr. Felt emphasized in closing his address, "only by protecting the various parts, especially the leaves, from attack by insect pests and fungous diseases and the trunk and branches from invasion by borers. . . The shade tree needs care throughout its existence in much the same way as the fruit tree."

For New York especially—or for any other large city—Nelson M. Wells offered a seven-point program of tree planting. In brief, he suggested:

1. That legal complexities should be cleared away so that unrestricted authority and responsibility rest with the Commissioner of Parks or some other responsible agency.
2. That adequate funds be provided to plan a street tree program properly and intelligently.
3. That the locations of trees with respect to curbs and property lines be carefully considered.
4. That the trees selected shall be of the finest quality and of types which are adaptable to the prevailing soils and exposures and the esthetic effects to be attained.
5. That provisions be made in the matter of ample soils and fertilizers, drainage, guying and guarding of young trees, and paving blocks or iron gratings to prevent the compacting of surface soils.
6. That a maintenance equipment be provided which is capable of practising the best known principles of forestry service.
7. That to rid our city atmosphere of the poisonous gas and soot which now pollute it, smoke abatement ordinances be enforced.

Program Of the Conference

Opening with an address of welcome by Dr. William J. Robbins, the program for the Eastern Shade Tree Conference proceeded as follows:

THURSDAY, DECEMBER 8, 1938

The Purposes of the Conference
W. O. Filley, Forester, Connecticut Agricultural Experiment Station

The Storm at Newark, N. J., and Reconstruction
Carl Bannwart, Superintendent, Newark Shade Tree Bureau

Hurricane Damage to Park and Street Trees in New York City
A. R. Jennings, General Superintendent, Department of Parks

Shade Trees and the Future in New Haven, Conn.
Fred S. Eaton, City Forester, New Haven

The Shade Tree Policy of Rhode Island
A. E. Stene, State Entomologist

The Cemetery Trees with Illustrations of Storm Damage
Oscar Burbank, Superintendent of Hope Cemetery, Worcester

Storm Damage in Vermont and the Forest Tent Caterpillar
H. L. Bailey, Entomologist, Vermont Department of Agriculture

Other Factors Affecting Storm Damage and Tree Welfare

Dealing with Storm Damage in Central Massachusetts
Prof. M. A. McKenzie, Massachusetts State College

Wood Rots as a Factor Before and After the Storm
Perley Spaulding, United States Bureau of Plant Industry

The Relation of Insect Work to Hurricane Damage
S. W. Bromley, Bartlett Tree Research Laboratories

The Future of the Japanese Beetle and Its Control
C. H. Hadley, United States Bureau of Entomology and Plant Quarantine

Two Introduced Insects of Evergreens, the European Spruce Sawfly and the European Pine Shoot Moth
R. B. Friend, Entomologist, Connecticut Agricultural Experiment Station

The Gipsy Moth as It Approaches the Barrier Zone
A. F. Burgess, United States Moth Control

FRIDAY, DECEMBER 9, 1938

Dutch Elm Disease and Other Problems

The Present Status of the Dutch Elm Disease
E. G. Brewer, Dutch Elm Disease Eradication

Dutch Elm Disease Control in New York State
W. H. Rankin, Supervising Horticulturist, New York State

Dutch Elm Disease Work in New Jersey
E. G. Rex, New Jersey Department of Agriculture

Dutch Elm Disease Work in Connecticut
W. O. Filley, Forester, Connecticut Agricultural Experiment Station

Importance of the Study of Root Systems of Trees
D. T. MacDougal, Desert Laboratory, Carnegie Institution

The Broader Aspects of Hurricane Damage to Shade Trees
E. P. Felt, Bartlett Tree Research Laboratories

Rehabilitation and Restoration

Soil Fertility and Root Development
Carl G. Deuber, Yale University

Trees on City and Village Streets
C. E. Van Fleet, International Municipal Signal Association

The Shade Trees of New York City
Nelson M. Wells, President, City Gardens Club

The Better Trees for Street and Ornamental Planting
George H. Hollister, Superintendent of Parks, Hartford

The Shade Tree Problems on Massachusetts Highways
J. V. McManmon, Director, Roadside Development, Massachusetts Department of Public Works

The Shade Tree Program of Connecticut
John L. Wright, Director Roadside Development, Connecticut

Breeding Trees for Disease Resistance
Arthur H. Graves, Brooklyn Botanic Garden

Plant Collecting In British Guiana

By A. C. Smith

OF THE countries of northern South America, British Guiana must be considered one of the most attractive from a botanical viewpoint. To the traveling scientist its 90,000 square miles offer many types of country, including coastal forest, interior rain forest, savanna, upland grass country, and a fine series of sandstone hills culminating in the famous Mount Roraima. Our botanical knowledge of British Guiana has the excellent background provided by the work of the Schomburgk brothers, whose chief books (6, 7, 8)* are known to everyone interested in South American travel. Another famous collector in the region was G. S. Jenman, Superintendent of the Botanic Gardens in Georgetown for many years. With the work of these early collectors as a basis, as many as a dozen more recent collectors have substantially increased our data concerning the flora (2, 3, 4).

On August 27, 1937, the Terry-Holden Expedition, sponsored by the American Museum of Natural History, with the collaboration of the New York Botanical Garden, left New York for Georgetown. The expedition was made possible by the generosity of Mrs. Franklin P. Terry, and was organized by Dr. William Hall Holden, Staff Surgeon of the American Museum. In addition to Dr. Holden, the personnel consisted of Mr. R. P. Snedigar, herpetologist, Mr. W. G. Hassler, photographer, Mr. O. W. Hungerford, radio technician, Mr. Neil MacMillan, and the writer as botanist. The objectives of the expedition were to reach the head of the Essequibo River, to study the Indians of that region with special regard for their health conditions and their useful plants, and to collect the fauna and flora of a hitherto essentially uncollected area. Enroute to Georgetown, we had time to spend a day in Caracas, where I had the great pleasure of visiting Prof. Henri Pittier, the distinguished authority on Venezuelan plants, and to examine parts of his herbarium. In Port-of-Spain, Trinidad, an interesting day was spent in the Botanical Garden.

Arriving at Georgetown on September 12, we immediately set to work preparing for the trip into the interior. It is an interesting coincidence that we arrived in British Guiana on precisely the one-hundredth anniversary of the departure from Georgetown of Robert Schomburgk on the trip which carried him to the Akarai Mountains, our own geographical objective. Georgetown, with its

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* The numbers in parentheses refer to the list of reference works given at the end of this instalment.

attractive Botanic Gardens, has been so frequently described that every reader of travel is acquainted with its historic situation, its interesting old markets, its fine broad avenues, and its modern business houses. Here we received every assistance from officials and from many private citizens, to whom the expedition is much indebted.

Two boats having been built and duly christened *Schomburgk I* and *Schomburgk II*, we proceeded to Bartica, a point of departure for travelers to the interior, situated at the junction of the Essequibo and Mazaruni Rivers. A third boat was hired here, and we took our final departure on September 19, heavily laden with stores and equipment. The crew consisted of 28 Arawak Indians from the Moruka region of the Northwest District and 14 negro boatmen to act as captains, bowmen, and engineers. Each boat on these rivers is required to carry licensed captains and bowmen, without whom a passage through the rapids would be impossible. There are also certain strict regulations concerning the size and draught of boats. The British Guiana government, by enforcing these regulations, has undoubtedly cut down the number of serious accidents on the rivers, but still several accidents occur yearly due to carelessness or over-confidence. Travel on these rivers may be perfectly safe and comfortable, if boats are manned by good crews and experienced captains. It is due to our good fortune in these respects that the entire trip was accomplished without a mishap, through many hundred miles of river travel.

The two *Schomburgks* were excellently constructed by Georgetown boat-builders, and were of the type best suited to the country. Each boat was about 38 feet long and seven feet broad, with a draught when loaded of about two feet. In constructing such boats, the most durable of the colony's fine timbers are used. For the keel, bottom boards, gunwale, and "bends", the well-known greenheart (*Ocotea Rodioei*) is preferred. The ribs, bow, and stern are of the strong mora (*Mora excelsa*). The sides are generally constructed of some lauraceous wood such as silverball (species of *Nectandra* or *Ocotea*).

Departing from Bartica, one leaves behind for a time most evidences of European influence. The Essequibo, a magnificent dark-water river often several miles in breadth (inclusive of islands), is bordered by one of the most impressive rain-forests of the world, typically Amazonian in appearance. The components of this forest are greatly varied, nearly every family of American trees being represented. Particularly impressive to the traveler are the great buttressed trunks of *Mora*, the towering silk-cotton

(species of *Bombax* or of the related genus *Ceiba*), and numerous attractive flowering legumes such as species of *Eperua*. Orchids, aroids, and other epiphytes are abundant, but pteridophytes, the fern plants, except for a few common species, are not conspicuous. Among the most interesting flowering plants of the region are several species of Podostemonaceae which characteristically cover the smooth boulders near water level. In this family the magnificent *Mourera fluviatilis*, with sprawling frond-like leaves and large erect pink-flowered spikes, is arresting in its colorful water-moved beauty.

Collecting along the Essequibo was hampered by continual travel, but a few plants were obtained near some of the many rapids which impeded our progress. At this time of year, the beginning of the short dry season, the rivers were far below their high-water limits, but nevertheless were quite navigable. An extensive series of rapids begins about 20 miles above Bartica, just above Moraballi Creek, on which the Oxford Expedition of 1929 (1, 3), with Mr. N. Y. Sandwith as botanist, made such thorough and valuable collections. Two days were consumed in passing through these rapids, among which is Itaballi Falls, where Robert Schomburgk, on one of his descents, lost the collections which represented many months of painstaking labor (8: 57). The modern use of outboard and inboard engines has greatly increased the speed and safety of river travel. On viewing the white rushing cataracts, one conceives a new admiration for the work of the Schomburgk brothers, who had only small dugouts and unaided man-power to make their many ascents and descents. Some of the rapids can be ascended with the aid of powerful engines and spells of hard paddling; at others the boats must be unloaded and pulled over long stretches with heavy ropes. Between Bartica and the mouth of the Rupununi River, which we reached on October 5, several laborious portages were necessary.

Two days of travel up the Rupununi, since the lower reaches of this river are free of rapids, brought us to Karenambo, the ranch of Mr. E. McTurk, whose hospitality we enjoyed for a week. From this point, our transport was under the direction of Mr. John Melville, to whose capable management the further success of the expedition was due. Mr. Melville was adequately assisted by his brother Charles, and we must also express the greatest appreciation of the kind co-operation of many other ranchers in the Rupununi District, notably Mr. T. Orella and Mr. Teddy Melville, as well as the hospitality of the Jesuit priests at St. Ignatius Mission on the Takutu River, Father Mather and Father Keary.

At Karenambo and Yupukari, a nearby Mission on the Rupununi, I was able to settle down to collecting for a short while. The river at this point flows through a savanna region, but for several miles on each side of the river are extensive stretches of forest and transitional growth. The actual border of the river is lined by thickets of the water-loving muka-muka (*Montrichardia arborescens*) and the mangrove-like *Psidium aromaticum* and *P. parviflorum*. The forest does not compare in height and luxuriance to that of the Essequibo, but there are many swamps and lagoons of great interest. In some of these lagoons are found the vast leaves and fragrant blooms of *Victoria regia*, the sensational waterlily first discovered by Robert Schomburgk and since introduced into many well-known botanical gardens. The lagoons

Photo by W. G. Hassler

Mourera fluviatilis growing on rocks in the Essequibo rapids.

abound in animal life, particularly caymans and large fish. To obtain the latter with bow and arrow or with the harpoon is a picturesque occupation of the Macusi and Wapisiana Indians of the region. About the lagoons, in trees bright with the showy orchid *Cattleya violacea*, many attractive egrets and cranes noisily inhabit their nests. The water itself is often covered by great fields of the water-hyacinth, *Eichhornia azurea*, and the little floating fern-relative, *Salvinia auriculata*.

One of the forest giants, Ceiba pentandra, the silk-cotton.

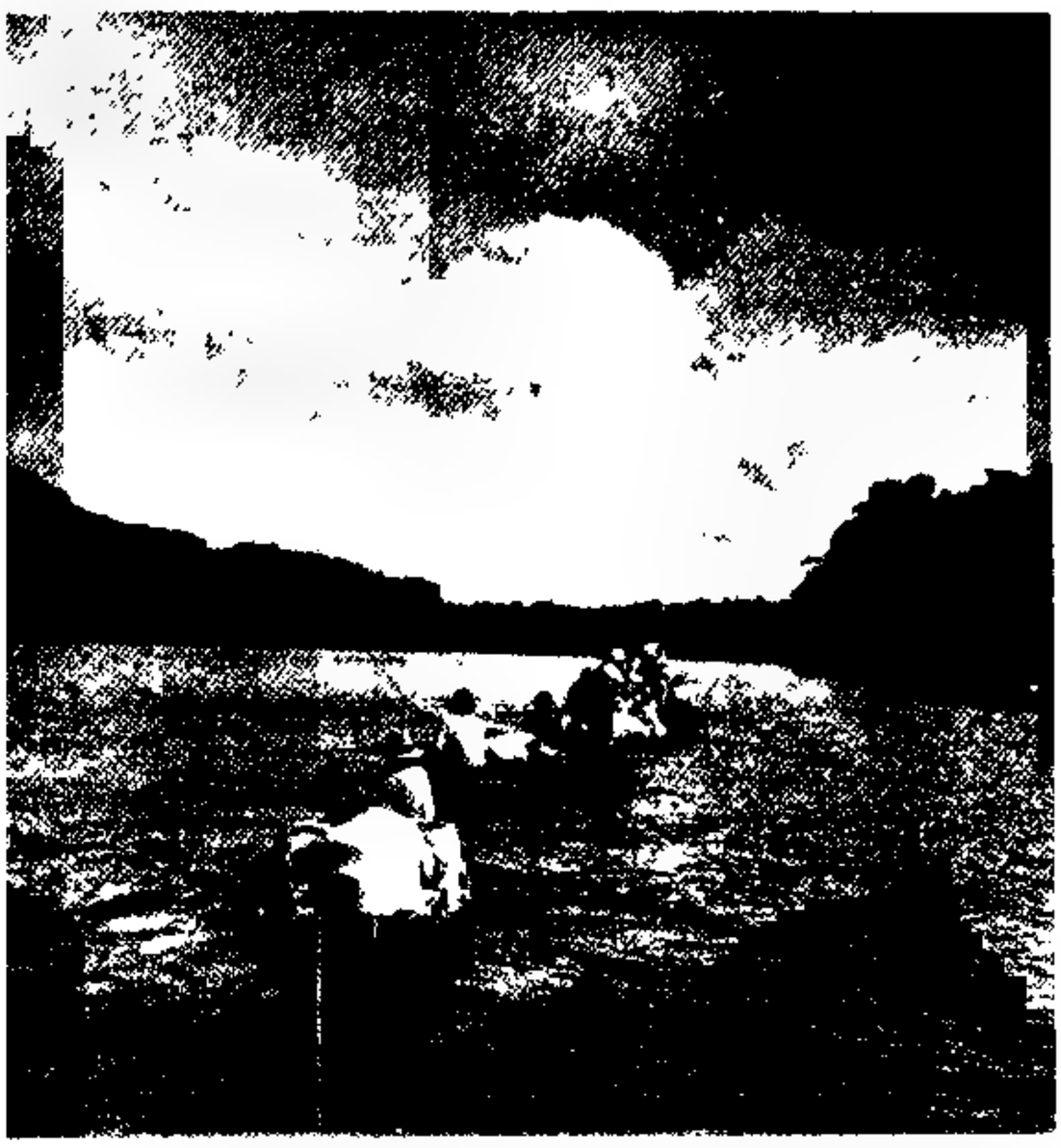
Botanical education of the Wai-wais.

A savanna oasis in a stand of the ité palm, Mauritia flexuosa.

EXPLORING FOR PLANTS IN BRITISH GUIANA

Forest of the Upper Essequibo, with typical granite boulders along the river.

Photographs by A. C. Smith



The expedition ascending the Essequibo not far from its source.

Flowers of Gustavia angusta, a tree of the Brazil-nut family.

A Rupununi rancher's Rupununi

Farther inland, and sometimes in a narrow belt along the river itself, is a strip of "bush" transitional between forest and savanna. The components of this interesting belt are also varied, but their height seldom reaches 20 meters. Beautiful yellow-flowered trees of the families Malpighiaceae and Vochysiaceae give color to the landscape. The most conspicuous feature of the Rupununi region is the vast savanna which extends southward for many miles between the Rupununi and Takutu Rivers and far into adjacent Brazil. This savanna is broken only by the magnificent forested Kanuku Mountains, an isolated mass of extreme botanical interest, and by a few scattered smaller peaks. On the savanna are plant associations worth detailed ecological study, because of the variation from dry areas of hard clay to small lakes and lagoons. The only tree in many parts of the savanna is the widespread sandpaper-tree (*Curatella americana*), which forms dense orchard-like groves and which provides rough leaves used as sandpaper. Beneath these trees and in swamps are smaller woody plants which appear to have crept into the savanna from the transition belt. Watercourses and swamps are invariably marked by stands of the slender ité palm, *Mauritia flexuosa*. On the open savanna most woody growth is supplanted by a great variety of herbaceous plants, among which grasses and sedges are predominant. The area provides good forage for cattle, the raising of which is the chief industry. Color is given to the otherwise sombre plain by the bright flowers of *Byrsonima verbascifolia*, *Desmocelis villosa*, *Cuphea gracilis*, *Sauvagesia Sprengelii*, species of *Xyris*, and many other low plants.

Among the most noteworthy features of the savanna are small shallow ponds, on the borders of which an interesting series of associations is found. In this habitat such plants as *Mayaca Aubleti*, the iridaceous *Cipura paludosa*, species of *Herpestis*, and the sundew, *Drosera sessilifolia* are abundant, among others of the families Eriocaulaceae, Butomaceae, and Cyperaceae. The shallow water of the ponds is bright with the flowers of the bladderwort, *Utricularia mixta;* the primrose-willow, *Jussiaea sedoides;* and the water-hyacinth, *Eichhornia diversifolia*.

The complex problem of the causes of savannas cannot be discussed in the present report, but the interested student is referred to the work of Lanjouw (5) and the bibliography there cited. The Rupununi-Takutu savannas in many places are underlaid by a layer of clay hardpan which may explain the absence of large trees. Fires set by Indians and ranchers may be a factor in maintenance of savanna, but they hardly seem a fundamental cause. The dry season in this region lasts about eight months and the

total rainfall is of course much less than that of the forest, but whether a long dry season is a cause or an effect of savanna is still a debatable question.

Leaving the Rupununi for a short while, the party passed around the western extremity of the Kanuku Mountains and returned to the river at Wichabai, Mr. John Melville's ranch. The overland trip to this point from Yupukari, about 100 miles, was covered in a week by using horses and bullock carts. The boat crews, with the exception of a few Arawaks, were sent back to Georgetown, and during the remainder of the trip our laborers were 20 to 30 Wapisianas. This is one of the finest tribes of British Guiana, its members being excellent woodsmen and hunters, and at the same time in sufficient contact with Europeans to have acquired the elements of foreign civilization. The Wapisianas occupy the extensive savanna region drained by the Rupununi and Takutu Rivers south of the Kanuku Mountains, while to the north of these mountains are found the Macusis, a tribe of completely different origin. The savanna area is well populated, not only by Indians, but also by European settlers who extend every assistance to scientific travelers. Except for a few staples, one can depend upon the country for food supplies.

This long trip across the savanna gave us a good opportunity to observe the flora, but collecting was impossible enroute. However, at Wichabai and other points south on the Rupununi I continued collecting, finding the savanna and its fringing forest similar to the region north of the Kanukus. For two weeks during November the entire party remained at Isherton, a site on the savanna near the Rupununi head which had previously served as a base camp for the British Guiana-Brazil Boundary Commission. From this point we followed the route used by this commission to the Essequibo head; their work a few years ago in opening up the region greatly simplified our subsequent travel. At Isherton, a few miles from the edge of the extensive forest which covers the southern part of the colony, a base radio station was set up, and Messrs. Hungerford and MacMillan remained there, returning to New York via Georgetown in February and March, 1938.

The rest of the party proceeded southward to the Kuyuwini River, traveling two days through the forest on foot, with pack-bullocks for transport. This trail passes through the isolated Parabaru Savanna, which would be well worth detailed study. The existence of a few such patches of savanna deep in an otherwise forested area seems to indicate that soil conditions, rather than rainfall, are the important cause of the Guiana savannas. From this point we followed the route taken by Robert Schom-

burgk in 1837, a route still used by Wapisianas in their trade with Wai-wai Indians of the Akarai region. Ten days were spent at the end of the trail on the Kuyuwini River, while a large "ballahoo" and several "corials" or dugout canoes were built. The ballahoo is a local craft well suited to shallow rivers, built of strong ribs and stout planks, with square ends. The absence of a keel makes such a vessel easy to manage on rivers where frequent impacts with rocks and submerged logs are inevitable. Corials are constructed of a single log and are often more than 30 feet long. After the log has been hollowed by the use of axes and adzes, it is spread by a manipulation of wedges and the use of fire. The finished craft may carry as much as a ton of freight as well as a crew of several Indians.

The entire area drained by the Essequibo and its tributaries south of the Rupununi mouth is at present uninhabited save for two small villages of Wai wai and Taruma Indians, with a total of perhaps twelve people. This is certainly one of the most sparsely inhabited areas of tropical America, as well as one of the least known from a biological viewpoint. A large part of this densely forested region is only slightly above river level, but between the streams and on the Brazilian boundary are ridges up to 1,000 or perhaps 1,300 meters elevation.

Collecting near the Kuyuwini River gave a fair sample of the flora of the entire region. The forest is nearly as high as that of the lower Essequibo, but appears to be even richer in its components. The large trees are of diverse families, among which the Leguminosae, Rosaceae, Annonaceae, Lecythidaceae, Euphorbiaceae, Moraceae, and Lauraceae are predominant. The surface of the Kuyuwini is often covered by dense mats of the flowers of a species of *Caryocar,* fallen from overarching trees. Important elements of the undergrowth, as elsewhere in tropical America, are species of *Piper* and members of the Melastome family. Bryophytes and pteridophytes are not common in this lowland forest. Epiphytic plants are only occasionally seen.

The river trip from our camp on the Kuyuwini River to its mouth occupied nine days, the party and supplies being divided among six crafts. Extremely slow progress was made along the upper river, which is frequently only a few meters broad and very shallow. Across it have fallen innumerable trees, and progress is made only by the continual use of axes. Here we passed through a belt of "pimpler bush", so named because of the abundance of a viciously armed palm, *Astrocaryum Jauari.* Where these palms have sprawled across the river, leaving their spiny petiole bases

hidden in the sand, great care must be used, as the spines cause flesh wounds easily infected.

The Kuyuwini River, like other parts of the upper Essequibo basin, is rich in game. Peccaries, capybaras, agoutis, other small rodents, and occasionally a tapir gave us plenty of meat, while several excellent bush fowl, locally known as the powis, marudi, and trumpet bird, are abundant. For food one may also depend upon fish of many sorts, among which we particularly enjoyed the carnivorous haimara, although this fish and the equally vicious pirai are not appreciated by bathers. It may be seen that the region offers no serious difficulties in the matter of food to a party properly supplied with staples. Mr. Snedigar and Mr. Hassler were pleased to find a fairly rich reptile fauna along the Kuyuwini. Several anacondas were seen and two were collected for mounting, the larger being nearly 22 feet long. Other animal life consists of otter, occasional "tigers", as jaguars, ocelots, and other cats are locally known, and many species of monkeys. The pleasantly awe-inspiring roar of red howler monkeys, perhaps the most characteristic sound of this forest, is heard every evening and morning.

It is a coincidence worthy of note that we passed into the Essequibo on December 8, one hundred years to the day after Robert Schomburgk reached the same point on his historic trip. Five days' travel up the Essequibo brought us to the mouth of Onoro Creek, a small eastern affluent, where nearly three weeks were spent. During this passage an outboard motor was used, the large ballahoo towing a series of corials in a sedate line. Subsequent to our stay in the Onoro region I was able to spend a week near one of the Wai-wai villages, where information regarding medicinal plants was sought. I was particularly interested in ascertaining what plants the Wai-wais use in preparing their arrow-poison. *Strychnos guianensis* seems to be the chief ingredient, while *S. toxifera*, the important component of Macusi Urari, is not known to the Wai-wais, nor was it observed in their territory.

Continuing our southward progress, we reached the mouth of Shodikar Creek, the last eastern affluent of the Essequibo. At this point the main river is about equal in size to the creek; all the existing maps are seriously in error in indicating the source of the Essequibo far south of its actual location. That this region once supported a large Indian population is indicated by great numbers of axe-sharpening grooves in the river-bed rocks and by several localities where the rocks are covered by ancient inscriptions. Even in Schomburgk's time there were many populous

villages which have since disappeared. At present, one is deeply impressed by the atmosphere of peace and solitude which hangs over the upper Essequibo region. Vestiges of past human occupation become fainter every year. It is inevitable that soon the region will lapse into its pristine state, a tremendous area of exquisitely beautiful forest, enveloped in peace broken only by the voices of birds and monkeys "chanting faint hymns to the cold fruitless moon."

Our last camp in this area was made several days' travel up Shodikar Creek, a narrow tortuous stream which has its sources in the Akarai Mountains. The work of the Boundary Commissions in this area was a great assistance to us, as trails are still in evidence. Along parts of the crest of the Akarai Mountains is a very good trail, cleared by the Brazilian Commission as recently as August 1937. On January 8, 1938, Dr. Holden and Mr. Hassler, accompanied by Wapisiana Indians acting as carriers, began a trip of several days over the mountains to the Rio Mapuera in Brazil. From this point most of the Indians were sent back, and a small party continued down the Rio Mapuera and Rio Trombetas to Para, from which Dr. Holden and Mr. Hassler traveled via Georgetown to New York, arriving there in April.

Mr. Snedigar and I spent about three weeks with the Shodikar Creek camp as a base. From this I was able to work in the low mountains which closely border the creek head. The lower elevations in this area have essentially the same components, at least as to genera, as the Kuyuwini region. However, one of the predominant trees is the stately brazil-nut (*Bertholletia excelsa*), which appears to be found, in British Guiana, only here and in a few areas slightly to the north. A trip was made over the crest of the Akarai Mountains, the international boundary, into Brazil. The higher elevations of these mountains support a flora for the most part specifically distinct from that of the adjacent lowlands. An Amazonian element appears to predominate. Epiphytic ferns and bryophytes are fairly abundant, while undergrowth consists of plants of diverse families, among them the beautiful white-flowered *Tachia guianensis*. The trees maintain essentially the lofty elevation of the lowland forest; among them may be mentioned a species of *Hevea*, a fragrant *Acrodiclidium*, and many species of Sapotaceae. It seemed that nearly one tree in every three, in this region, yielded abundant white or yellow latex when cut. It was difficult for us to agree with Schomburgk's description (8:116) of the Akarai Mountains as a region reigned over by "the silence of Death." We found that howler monkeys and

numerous birds cheerfully kept the forest noisy. The insane yelping of toucans and the discordant cries of macaws were nearly always to be heard.

Toward the end of January the remaining members of the party, including the Messrs. Melville, started downstream, our supply of staples being exhausted and collecting equipment in poor shape. Nearly continuous rains during January greatly hampered our work. We had intended to descend the Essequibo to the Rupununi mouth, as the middle stretch of Guiana's largest river is essentially unknown. The geologist Barrington Brown is the only scientist who has traveled this stretch. Because of the heavy rainfall, however, the Essequibo was so high that to descend the always difficult falls would have been impossible. Therefore we retraced our route up the Kuyuwini River, the upper part of which was dry enough to offer great difficulties. In one place the entire flow of the river could be stepped across. After stops of a few days at our Kuyuwini Camp and Parabaru Savanna, we reached Wichabai on February 21.

It is through the generous aid and the co-operation of the American Museum of Natural History, Mrs. Terry, and Dr. Holden that botanical work in this area was made possible.

During the Terry-Holden Expedition I was able to collect 981 herbarium numbers in sets of 10 or 11, and 323 wood specimens. Although somewhat disappointing in volume, this collection will doubtless add much to our knowledge of the flora of an almost unknown area.

(*To be continued*)

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Question Of The Month

Poinsettias In The House

Last Christmas we purchased three poinsettias in a pot, each one in bloom. After the plants were through blooming, we cut them back to within six inches of the soil, then placed them in the cellar for a resting period. About August of this year we brought them onto the porch and they grew well to about two feet high, with beautiful foliage but not a sign of a blossom. We have them in a sunny window now (Dec. 19) but do not think they are going to bloom. What can be done to make these plants flower again, or are they through blooming?

The poinsettia cannot be regarded as a satisfactory house plant, although occasionally people succeed with it. Providing the shoots produced from a cut back plant were strong and retain their leaves, there is no reason why they should not flower about Christmas time. If a plant does not bloom, I can only suppose that the shoots produced were thin and weak, in which case either no flowers will appear or if any are borne they will be small and of poor quality.

The best method of handling old poinsettias is to start them into growth after the resting period, sometime between May and August, and *at that time* to repot them in a rich porous soil. As growth develops they should be afforded full sunlight and receive careful attention with regard to watering. One of the chief difficulties experienced in house cultivation is that of maintaining uniform temperatures, for the poinsettia resents wide fluctuations. A night temperature of 60 degrees with a rise to 65 or 70 degrees during the day is best for these plants. Another difficulty experienced in growing poinsettias under dwelling-house conditions is the lack of humidity in the atmosphere, a cause which is frequently responsible for the shedding of leaves after the plants are removed indoors and subjected to artificial heat. In the greenhouse this is counteracted by frequently wetting down the floors and benches on which the plants stand. This cannot, of course, be done under house conditions but a broad shallow tray of moist gravel or sand placed beneath the pots will be of some assistance.

If your plants do not make satisfactory growth this year it would hardly be worth while keeping them another season. Strong plants, however, after they have completed blooming, can be partly cut back and rested for a while in the cellar before being started into growth again.

T. H. Everett.

Percy Wilson Retired

AFTER forty years of service, chiefly on the scientific staff of The New York Botanical Garden, Percy Wilson, Associate Curator, was retired the first of January. An early associate of Dr. N. L. Britton, he accompanied him on many of his trips in the West Indies, worked over the plants collected there, and became an authority on the flora of that region.

Upon his retirement the Board of Managers of the Botanical Garden presented Mr. Wilson with the following testimonial resolution, wishing him at the same time "the best of health and a long and happy life":

> Since the early years of The New York Botanical Garden, Mr. Percy Wilson has been one of its trusted and efficient employees. During his career of forty years, interrupted only by a single year in Cuba, he has served successively as museum assistant, administrative assistant, docent, assistant curator, and associate curator, and has been faithful and productive in all. His extensive research into the flora of the West Indies has made him a recognized authority on the subject, and he shares with the late Doctor Nathaniel Lord Britton the honor of authorship of the Flora of Porto Rico and the Virgin Islands.

Mr. Wilson will continue his connection with the Garden as Research Associate.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

The Herbal as a Background To Modern Botany

> HERBALS, THEIR ORIGIN AND EVOLUTION. Agnes Arber. 326 pages, illustrated, indexed. Appendix Cambridge University Press, Cambridge, England. 1938. $7.50.

To the botanist, Mrs. Arber's book is a prelude to Linnaeus, "A Chapter in the History of Botany". The author, in the preface, clearly limits her field of research:

> "The main object of the present book is to trace in outline the evolution of the printed herbal in Europe between the years 1470 and 1670, primarily from a botanical, and secondarily from an artistic standpoint."

The picture on the jacket is enticing. In that "Herbalist's Garden and Store room" from "Das Kreuterbuch oder Herbarius", 1534, we see lovely ladies supervising apple picking or laying sprigs of herbs between the voluminous folds of garments in a linen chest, while men in robes with trailing sleeves are variously engaged in investigating the fruit and one apparently pouring oil from a bottle over his bushy hair. But this delightful picture is not a forerunner of the contents of Mrs. Arber's book.

On the other hand, the book is a masterpiece of comparative study of the old herbals in regard to the progress from early times in plant classification, description, and illustration. First published in 1912, it now has been rewritten and expanded by a section on botany in Spain and Portugal, and one on the origin of herbaria; by an increase of bibliographical

sources and a helpful subject index to them. Chronologically arranged is a list of the principal herbals printed between 1470 and 1670. Mrs. Arber points out that after that period we hear less of herbalists since botany had taken an independent place in the world.

In Chapter I is an interesting discussion of the early manuscript herbals. The importance of the great Dioscorides, revered by some even to the present day, is shown, ironically enough, to be not because of his worth as an herbalist, but really because the constant effort to elucidate his writings led to a study of plants. In Chapters II, III, and IV, printed herbals of the 15th, 16th, and 17th centuries are briefly sketched, page references given to characteristic illustrations, and the careers of the principal herbalists summarized. Some 80 books are discussed in this 133-page survey which serves as a background for Mrs. Arber's thesis. The next three chapters presuppose the reader to have a clear picture of all the herbals mentioned previously, reference being made to those books by way of example. The result is that each of the principal herbals is discussed four times, each time for a different purpose. This is confusing to anyone unfamiliar with herbals and herbalists, but to the thoroughgoing student these comparisons furnish hours of fascinating study and reflection.

In Chapter V there is taken up the subject of plant description. The author theorizes that a knowledge of the actual plants must have been transmitted by word of mouth.

> "The pictures in the herbals were so poor and the descriptions so inadequate that identification must have been practically impossible."

The herbals, she thinks, were merely reference books from which to learn the healing qualities of the herbs with whose appearance the reader was already familiar.

Chapter VI sets forth the confused state of plant classification in the early days. Gradually during the 16th and 17th centuries was developing the idea of natural affinities among plants, and in Caspar Bauhin's "Pinax", 1623, order from chaos resulted. From the time Linnaeus received a copy of this book, he read it constantly — and to what results, the botanical world today is well aware.

In Chapter VII, it is made clear that the art of plant illustration was not progressively better in each age, many of the ancient figures having a more modern quality than some drawn as late as the 17th century. Most of the illustrations in Mrs. Arber's book are to show the quality of the early efforts at botanical illustration. There are 26 plates and 131 figures. Half of the plates and 116 of the figures are of plants. The story of the woodcuts is most interesting. The author has painstakingly checked on each herbal and shows how the same woodcuts appeared again and again, largely because of the fact that between 1530 and 1590, there were only five important collections of woodcuts.

Chapter VIII is devoted to the Doctrine of Signatures and astrological botany; "backwaters, connected with the main channel, but leading nowhere." Mrs Arber asserts that William Cole attacked astrological botany and gives a supporting quotation which I cannot find in either of his books, originals of which I have. In "The Art of Simpling", however, there is a long paragraph which seems to indicate the contrary. In part it reads: "I cannot readily close with their opinion. who over-confidently deny the Sun, Moon and Stars, to have any influential power upon Vegitables, etc."; and though the plants were made on the "third day" and the Sun not until the fourth, "the Primitive & Aethereal Light" from which the sun was made, bestowed some proportion both of heat and influence on the "new created Vegetables".

In the dates of editions, there are two discrepancies. One relating to Askham's "A Lytel Herball" which Mrs Arber states was printed by Jhon King in 1555, the date of 1550 in the title being incorrect since "King had not then begun to print, the reference is probably to the date of the Almanacke" which, strangely enough, did not appear in the edition. Mrs. Arber apparently has overlooked the edition of 1550, printed by Wyllyam Powell, an original copy of which this reviewer owns.

Then, in discussing the herbal of Monardes, issued in a series of three parts, Mrs. Arber speaks of the earliest picture of the tobacco plant to appear in a printed book, as being in Part I, 1569, but the illustration taken from the herbal is identified as "Monardes, Segunda parte del libro, 1571".

To those to whom "Old Herbals" is synonymous with still-rooms, sirops and

electuaries, remedies for the "bitings of mad dogges" or for "over much sighing", to those who, through the pages of the dainty "A Lytel Herball" or of the huge "Cruydt-Boeck" of Dodoens, project themselves into the lives of the herbalists, what they ate, what tools they had, what beliefs and superstitions they cherished, Mrs. Arber makes no appeal. Her book is for those interested in the history of plant taxonomy, in the development of scientific accuracy in plant description, and botanical illustration, in the romance of the early woodcuts, in the comparison of the old herbals from the botanical point of view.

ROSETTA E. CLARKSON.

Garden Record Books

A YEAR IN MY GARDEN. A Day-by-day Guide and Record for the Home Gardener. Compiled by Paul W Dempsey. The Stardard Diary Co., Cambridge, Mass., 193[illegible]. $1.
INSIDE MY GARDEN GATE. A Record of My Garden; Clippings of Interest and My Garden Notes. Revised edition. Planned and arranged by Julia A. Latimer. Mamaroneck, N. Y., 1938. $1.60. With celluloid index tabs, $3 Gift edition in leather, $10.

Here are two distinctly different types of garden record books.

Professor Paul W. Dempsey of the Waltham Field Station of the Massachusetts State College offers a compact little diary arranged for a twelve months' period in any year, with a brief cultural hint on every page.

Mrs. Latimer, well known garden consultant and lecturer, presents a revised edition of her loose-leaf note book consisting of printed sheets on which to keep plant records. They are arranged under classified subjects and the index tabs reveal the various sections such as Rock Garden Plants, Annuals and Biennials, Roses, Ground Covers, Work of the Month, Succession of Bloom, Color, and other similarly useful topics.

ELIZABETH C. HALL.

Up-to-date Propagation

PROPAGATION OF PLANTS. M. G. Kains and L. M. McQuesten. 555 pages, indexed and illustrated. Orange-Judd, New York, 1938. $3.50.

Messrs. Kains and McQuesten have dealt in a very thorough and understandable manner with all phases of plant propagation. They have compiled a book of 555 pages, illustrated with some 350 plates, which is so written that it will be a great asset to the library of any experienced man in this field, being at the same time of equal value to the student and amateur gardener.

Reproduction of plant material has been carefully discussed from nature's method of seedage to the latest practical application of inorganic growth substances for use upon cuttings.

Not only has the mere establishment of new plant units been dealt with, but with the same thoroughness that marked the material on propagation, such subjects as potting, transplanting, greenhouse fumigation, propagation structures, nursery management, pest control and several other points are adequately considered.

The latter portion of the book contains several condensed cultural tables which deal with all the major types of plant material. These should prove very useful to gardeners in general.

Should this book be used as a text, it is well equipped with 55 pages of Practicums and notes for teachers.

The original edition of Propagation of Plants, published 22 years ago, has been completely modernized with much new material which has come to light in the last five or ten years. This new edition should therefore be as useful and popular as was its predecessor.

JOHN T. MOSS,
Yale University.

More on Hardy Bulbs

HARDY BULBS, Vol. 2 (Amaryllidaceae, Commelinaceae, Haemodoraceae, Orchidaceae, Scitamineae.) Charles Hervey Grey. 368 pages, with color plates and drawings by Cecily Grey. Index and glossary. E. P. Dutton Co., New York, 1938. $8.

Here again, as in his first volume of the Hardy Bulbs trilogy, Lieutenant Colonel Grey supplies a useful and convenient temperate zone manual of the "bulbs, tuberous and fibrous rooted plants" in the various families noted above.

This treatment, of course, as in the case of his previous book on the Iridaceae (Vol. 1) covers those subjects which the author regards as "half-hardy" as well as those strictly hardly like the Narcissus, Leucojum, Ixiolirion, and various terrestrial orchid species treated toward the close of the book. Many of the more tropical items are not touched.

Although it occupies only the first 115 pages, the section on the Amaryllidaceae will be of principal importance to the average gardener. The Commelinaceae, which includes the familiar Tradescantia, covers about 18 pages, the Haemodoraceae, 32 pages, Orchidaceae no less than 163 pages, and Scitamineae 30 pages. Indeed, the tail rather wags the dog.

The Amaryllid section, as well as the Scitamineae and doubtless the others, discusses many subjects which are only safe as greenhouse plants in the United States, except in the lower South as around the Gulf Coast, and in southern California. It seems remarkable that Lt. Col. Grey is able to cultivate, outdoors, so many bulbs in Kent, even with some protection, that are sometimes precariously near extinction on frosty nights in Florida! Such things as Clivias and *Haemanthus Katherinae* are almost necessarily greenhouse plants even there!

This is the only inconsistency of Lt. Col. Grey's book. As long as he has given us a taste of so many things subtropical and tropical, it is really too bad he did not spread his field a little wider. The author apparently missed Mr. J. R. Sealy's revision of the Zephyranthes-Habranthus-Hippeastrum group in the R.H.S. Journal, during 1937, although he noted Dr. H. H. Hume's new revision of the Cooperias, in February 1938, and unfortunately the publication date just misses other important botanical rearrangements in the Amaryllis family, including the invalidation of the genus Hippeastrum as described by Dr. J. C. Th. Uphof in the 1938 issue of *Herbertia*.

Lt. Col. Grey follows the rather outmoded Bentham & Hooker system (Genera Plantarum) in the book, although he admits on page 135 that it would have given him "much pleasure" to have based his work on Dr. J. Hutchinson's new classification in the latter's "Families of Flowering Plants, Monocotyledons", 1934. He explains that much of the present volume "had been written and set up in type" when the Hutchinson views were published.

The Cecily Grey illustrations are delicate and artistic, and usually attractive, especially so the color plates of *Nerine Sarniensis*, and the Chilean rarity *Tecophilaea cyanocrocus*.

Probably the author could have abridged his technical descriptions and diagnoses without lessening the utility of his work, since the value of the volume as a botanical or taxonomic reference work is limited severely by its planned narrowness of scope within the particular fields covered.

Nevertheless, if the book, while written for British readers, serves to introduce the amateur and professional garden and greenhouse growers of America to even a part of the dazzling array of the wonderful plants it treats, it will serve its purpose, and it may prove one of the seeds of a growing interest in the rare and fine things so shamefully neglected by western horticulture.

WYNDHAM HAYWARD,
Secretary, American Amaryllis Society.

Current Literature At a Glance*

By Virgene Kavanagh

Repository. Type specimens should be placed in a central repository in a place readily accessible to those who need them, but far from probable military objectives, according to F. R. Fosberg. He suggests that such a repository should be considered at the 1940 International Botanical Congress.—*Journal of Botany,* November 1938.

Man and Mycology. Human allergy has been used in identifying species of *Cladosporium*. In addition to providing a new mycological technique, perhaps this reaffirms the old saying that everything has its uses.—Guba and Rackemann, in *Mycologia,* November-December 1938.

Weed Pictures. Do you recognize the common weeds as they show above the snow? The photographs by E. L. Palmer in *Nature Magazine,* December 1938, should help you.

Argentina. *M. A. N.* is the somewhat puzzling name of a pictorial publication of the Ministry of Agriculture of the Argentine Nation devoted to scenes related to agricultural industries.

Cacti as Art. In Mexico where they have been cultivated for food and beauty

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

for many centuries, cacti are named among the art treasures of the country. Some of them are described as "silken flowers on bronze stems" in an article in *Mexican Art and Life* for July, a new publication of D.A.P.P., the publicity bureau of Mexico, published at Bucareli 12, Mexico City.

National Parks. Volume 1 of the *Regional Review* published by the National Park Service, Region One, Richmond, Virginia, is completed. The publication aims to encourage citizens to visit national shrines and to use national parks as centers of recreation by publishing popular articles on the plants, animals, minerals, Indian and historical relics, caves, springs, and developments of the area. The August number has an article on the azaleas of the Great Smokies by H. M. Jennison.

Cactus Terms. *Cactus* is publishing a guide to the pronunciation and meaning of plant names and botanical terms with which cactus lovers should be familiar. "E" and the beginning of "F" appeared in the November number.

Revival. A contributor to *The American Rose Magazine*, November-December 1938, reports that roses which were badly wilted when received revived and looked as if they had been freshly cut after they were put in a solution of the root-inducing substance known as hormodin A. However, none of the flowers were put in water without hormodin A to see if they would also revive.

Measurement. The term "board feet", which is endemic to North America, was originally applied interchangeably with "superficial feet" to indicate the space which boards would cover. It supplanted a simple linear measurement of lumber. "Some Anomalies in the Board Foot Measurement of Logs", *Journal of Forestry*, October 1938.

Museum. The Buffalo Society of Natural History has published a history of the growth and expansion of its museum in "Seventy-five Years", which comprises Vol. 18 of its *Bulletin*.

Usefulness. To the person who feels he could scarcely defend his research problem on a commercial basis, Dr. A. Flexner's "The Usefulness of Useless Knowledge" should provide comfort, at least, if not ways of sidestepping the attacks of more practical friends.—*American Journal of Pharmacy*, September 1938.

Notes, News, and Comment

A.A.A.S. Two papers were given by Dr. William J. Robbins at the 103rd meeting of the American Association for the Advancement of Science at Richmond, Va., during the week after Christmas. Before a general session he spoke on "Thiamin (Vitamin B1) and Plant Growth" and before the section on plant physiology he spoke on "Recent Observations on Plant Growth Substances"

Dr. H. A. Gleason spoke before the plant taxonomists on "The Concept of the Species" Dr. W. H. Camp addressed the group on "*Asclepias tuberosa* vs. *A. decumbens* and the Species Problem" and Dr. A. C. Smith reviewed his recent expedition in British Guiana. Others from the Garden who attended the botanical meetings were Drs. B. O. Dodge, F. J. Seaver, and H. N. Moldenke; Clyde Chandler and E. J. Alexander, besides three graduate students, Charles Gilly, J. D. Dwyer, and Ellys Butler. J. P. Carabia, who spent several months at the Garden before returning to Cuba the first of the year, gave a paper before the systematic section and the plant taxonomists in which he briefly described the flora of Cuba.

Reports on the Richmond meetings were given by those who attended at the monthly conference of the staff and registered students Jan. 11.

Exhibit. Watercolors showing scenes and plant life in Korea, done by Florence Hedleston Crane, who as the wife of a missionary has spent 25 years in that country, were shown in the Museum Building from Dec. 14 through Jan. 8. On the mezzanine at the same time were exhibited 100 of Mrs. Crane's 700 individual flower paintings. Many from the collection have appeared in her book, "Flowers and Folklore of Far Korea", but all of those shown represented recent work. She plans to complete her flower paintings by illustrating, upon her return to Korea, all the remaining flowering plants, exclusive of grasses and trees. An article on folklore connected with Korean plants will appear in a forthcoming number of the Journal.

Holiday Display. Many out-of-town people were among the four thousand or more who left their holiday celebrations on Christmas and the day after to visit the floral display at The New York Botanical Garden. About twice as many appeared over the New Year week-end.

Nearly 2,000 pots of flowering and foliage plants of 77 species and varieties were used in the special display, for which a spacious garden effect, with grass-bordered beds of flowers, was created in the domed house at the northwest corner of the conservatory. In the house adjoining colorful plants were massed down the center and set attractively on the benches along the sides.

Poinsettias in white and pink as well as red were one of the features of the display, which also included several hundred pots of Christmas begonias, white callas, lilies of the valley, lady-slipper orchids, cyclamens, Roman hyacinths, paper-white narcissi, primulas in pastel tones, Jerusalem ("Christmas") cherries, and showy groups of many other plants, including *Plumbago indica coccinea, Iboza riparia, Malvaviscus penduliflorus,* and *Piqueria trinervia* (the "stevia" of florists).

Most of the rest of the range, including the new tropical rain-forest, the tropical fern house, and the three houses devoted to succulents, was also visited by many people over the holidays. With seasonal changes, the floral display will continue until June.

Conference. Dr. Edmund H. Fulling showed colored slides and motion pictures taken in Peru and Chile and spoke on his visit to those countries at a meeting of the staff and registered students on Dec. 14

Visitors. The holidays brought a number of botanists to the Botanical Garden, most of them stopping here on their way to Richmond. Among them were Dr. William C. Steere, University of Michigan; Dr. Ralph W. Chaney, Berkeley, Calif.; Dr. F. Raymond Fosberg, University of Pennsylvania; and Dr. David R. Sumstine, Carnegie Museum, Pittsburgh.

Others were Robert T. Clausen, Bailey Hortorium, Ithaca, and Frank E. Egler, New York State College of Forestry. In addition to those who were here for the Eastern Shade Tree Conference, earlier winter visitors include E. D. Merrill, Arnold Arboretum; David R. Keck, Carnegie Institution, California; Rodney P. True, Director, Morris Arboretum; George J. Fritz, University of Montana; Earl A. Roadman, President of Morningside College, Sioux City; Luzern G. Livingston and Harry Wood, Swarthmore College; George M. Hotchkiss, Ciudad Bolivar, Venezuela; Lewis Hebbs, David Calthorpe, and Natalie Balls from England; Hiroshi Hara, Tokyo Imperial University; and A. P. Arguelles, Director of the Bureau of Science, Manila.

Lectures. Dr. H. N. Moldenke spoke at the Museum of the City of New York December 4 on "Trees of New York City" and on November 24 to the Roselle Park Nature Club on "Plant Life in the Watchungs".

Addisonia. Beginning with 1939, Addisonia will be issued only once a year. This decision, which the Board of Managers made with regret but of necessity, was brought about by the many additional demands upon the Garden's resources. During the early years of the publication, which was established in 1916 through a bequest from Judge Addison Brown, this magazine appeared four times a year. From the beginning, the income from the bequest was supplemented from the Garden's general funds, but as demands on the institution grew while funds remained more or less stationary, it became increasingly difficult to find the means of supporting this unique periodical. In 1933 the issues were reduced to two a year. Further demands upon the Garden's funds have made it necessary again to restrict the magazine. With its colored plates and popular descriptions of plants, there is no other publication in America comparable to it, yet Addisonia has had to be sacrificed to more exigent public services. It is hoped that an additional endowment may eventually be found which will enable the Garden to return to normal publication of this periodical. The final number of Volume 20 is being mailed this month to members of the Garden and subscribers. Beginning with Volume 21, the publication of only one number a year will mean that the volume of the usual four numbers will be completed in four years. The subscription price per volume will remain unchanged.

THE NEW YORK BOTANICAL GARDEN

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Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

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Annual Member	annual fee	$ 10
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Fellow for Life	single contribution	1,000
Patron	single contribution	5,000
Benefactor	single contribution	25,000

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

February, 1939

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FOR THE COMING SEASON

While several thousand people every week are enjoying the ever-changing floral display in the main conservatory, preparations for the coming season outdoors are well under way in the other greenhouse ranges. "Unheralded and unsung" the gardeners work through fall and winter to create displays for the following year.

Since last autumn, for example, many hundreds of plants have been propagated for the Thompson Memorial Rock Garden. Their winter culture demands careful attention to light and moisture, temperature and ventilation, to insure strong, healthy plants.

For spring bedding, 3,500 wallflowers, seeds of which were sown last June, are being nursed through the winter in coldframes which are made comfortable with heaps of manure at the sides and protective mats across the top.

In warm parts of the greenhouse, heliotropes and lantanas are being trained as standards with every side-shoot assiduously pinched off. Thousands of hunnemannias are being grown in individual pots for summer bedding.

In a tank of water kept at an even temperature of 90 degrees, checked several times each day, five young plants of *Victoria regia* are being grown. The other tender waterlilies for the conservatory court and for the World's Fair are also being pampered over the winter in the warmhouse.

Through the long cold months, young daylilies for outdoor display are developing like slender blades of grass in the greenhouse. February 1 saw the stock plants of chrysanthemums moved in from the coldframes for the production of 4,000 cuttings. The fleshy dahlia roots, dug at the onset of frost last November, have been split up, dusted with sulphur, and carefully stored until late May.

Outdoors, all of the heavy groundwork was finished late in the fall. Most of the garden areas were double-dug, manured, and left rough so that the soil, with but little extra handling, will be in condition for planting in the spring.

Gardening cannot be improvised; it must be planned systematically. Preparations for a single season's displays are carried on for many months, sometimes for several years, before the public sees the results.

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Pointers For Exhibitors At Flower Shows

By Ethel Anson S. Peckham

(Adapted from a lecture given by Mrs. Peckham at The New York Botanical Garden.)

FEW people realize how closely the exhibiting and judging of flower shows are knit together. To be either a good exhibitor or judge one has to know a great deal about plant material and how it is best shown; also about the principles of design, the demands of good current and historical taste in the art of living and the ideals that garden clubs and horticultural societies are trying to further. A show is supposed to be educational and the awards are merely announcements to the visiting public as to what the experts have found to be best. Published accounts of prize-winners rarely tell in detail why a particular exhibit merited the attention it received, and too often some absurdity that is more curious than beautiful receives so much attention that great harm is done. The ignorant then delight in rushing to copy some "stunt" that has no definite value from either the horticultural or artistic point of view. Confusion exists also in that the horticultural classes are often judged in quite a different manner from the artistic ones.

When we come to consider *rules,* I feel that the general run of people connected with shows are very slack about the proper use of this word. One hears lecturers, exhibitors, and even judges often say, "Discard the rules, use your own ideas, be original." What they *mean* is that in some cases one should throw aside old sayings about various phases of the art or use of material and be original in carrying out the problem. They do not mean—at least, I *hope* they do not mean—to disobey the rules of the flower show. Exhibitors *must* obey the rules of the show they are exhibiting in or they run the risk of being disqualified—and rightly so. The rules are important. My point boils down to this: that writers

and speakers should use the words "rules" and "principles" in their proper places and, while making spectacular statements likely to catch the eye or ear of the more careless-thinking listener, weigh well how some foolish or novice exhibitor may misunderstand and thus perpetrate an atrocity that it will take much time and effort to eradicate.

Because in a flower show better horticulture is being stressed, the standard must be higher than for the flowers, fruits or vegetables normally seen. The exhibitor should show only the finest varieties—those that meet the standards of excellence set by the special plant societies and not only the best of tried sorts but the finest of newer or less known kinds. Each subject must be shown in its proper class and in the way best calculated to set off its good points. The exhibitor has to know horticulture well.

Besides this, much needs to be learned about the cutting, handling, keeping, packing and transporting of material. Flowers and plants reserved for the show need protection from winds, bad weather, or hot sun both in the garden and under cover. Some plants have to be disbudded or forced for the show. Other material has to be retarded or even cut and put in cold-storage. Volumes could be and are written about such details.

When it comes to staging the exhibit, not only must the rules and class specifications be carefully studied and complied with, but the selection of the material is vital. Here is where the exhibitor can exercise his judgment. Fixing up the flowers by removing dead leaves or broken petals, termed "dressing," is allowed within reason, provided the character of the variety is not changed. Wiring and other artificial aids are prohibited in horticultural classes, whereas tying is sometimes done in artistic classes provided it does not show or it can be made part of the design.

When cutting the flowers the knowledge of the methods for exhibiting certain sorts is essential. Tulips should be gathered with the stem-leaves on, therefore the stems are cut close to the ground; delphiniums are cut with the full stalk, usually with side-branches attached, and preferably with the flowers evenly spaced but not too crowded, so that each floweret may be clearly seen. Climbing roses are generally cut by taking a section of the full-flowering branch of the length specified in the schedule; other roses are cut in smaller bud than they are expected to be in the show, for they open rapidly. In some types of roses, buds are allowed to remain on the stem, whereas in others, such as the hybrid teas when shown in classes where good horticulture would be practised by disbudding, buds are prohibited. Always to be remembered is the fact that the judges consider whether the ex-

hibit is good *according to its variety* or, in the esthetic classes, *according to its prescribed style or period or use.*

In staging horticultural exhibits for the specimen classes, only the very best are chosen. A *specimen* means one: one flower, one stalk, one spike, one plant, etc. An exhibitor selects an entry by gradually eliminating one after another until the specimen remaining has everything necessary in the way of length of stem, color and health of foliage, quality, color, form, size of flower, and condition of the whole. All these attributes go into the judging, and sometimes the novelty of a plant or its correct naming will add a point or two. Condition is important because the judges will pass by exhibits "not in flower show condition." For the classes calling for two or more of the same variety, *uniformity* is the principal attribute; three flowers exactly alike though smaller will win over two large and one smaller one, for example. The same applies to vegetables, fruits, pot-plants, and other subjects.

In cutting plant material, use sharp instruments, put the stalks at once into deep receptacles filled with cold water in a cool, well-ventilated place, preferably dark, and be sure there is no draught or sudden change of temperature. Some flowers need to be treated by burning the ends of the stems or searing them.

The packing requires skill and experience also. Flowers travel best if firmly placed in the box so they cannot slide about but they must not be so crowded they get crushed. Each variety should be correctly and legibly labeled. The easiest way to do this is to tag each kind while cutting and to check the names again when packing. Damp cotton placed around the ends of stems with wax paper outside the cotton often helps to keep difficult subjects fresh. Fragile sorts can have strips of wax paper pinned around the flowers to hold the petals in place even before they are cut in the garden. Stalks of iris with the terminal bud just ready to open downward may be laid on long strips of paper, folding the paper back and forth as each stalk is put down, then rolling the bunch in several thicknesses of newspaper. These bundles carry very well provided they are not jostled about. To carry flowers or plants exposed in an open car is fatal. For any class take more material than is required by the specifications.

Let us hope that every exhibitor reads the rules and schedule carefully, studying the classes early and experimenting and working beforehand over the exhibits. Let each one also emphasize the purpose of the class and thus overwhelm the judge with the realization that these exhibitors knew what they were about.

Three New Daylilies

By A. B. Stout

THE daylilies described below were developed at The New York Botanical Garden, two of them by hybridization and selective breeding and the third by selection from many plants of the same species which were brought to the Garden directly from the Orient. The ***August Pioneer***, ***Festival***, and ***Hankow*** daylilies will make their first bow to the public this year through the Farr Nurseries, where these new clones have been propagated for the trade.

August Pioneer

The general habit of this plant, an illustration of the flowers of which is shown on the cover, resembles that typical for the erect type of *H. multiflora*, which is one of its parents, but the plant is more robust and the flowers are larger and they have a flush of fulvous coloring. The scapes are about 34 inches tall, slender, well branched and mostly extending above the leaves. The foliage becomes brown, wiry, and fully dormant in autumn and the plant appears to be very hardy. The open flower has a spread of about 3½ inches; the coloring is chrome-orange with a delicate flush of reddish especially over the outer half of the petals. The flowers are well open throughout the day until about dusk. At New York this plant has bloomed with conspicuous profusion during late August and its period of bloom has continued into September.

Festival

This daylily has a vigorous and robust habit of growth with coarse, erect, and much-branched scapes that rise to a height of about four feet. The foliage is medium coarse and it remains green until the first freezes of autumn. The flowers are about five inches in spread, the petals somewhat twisted and folded. The throat of the flower is a rich orange; the sepals are orange with slight reddish-brown tinges; the blades of the petals are nearly English red with darker veins and an orange mid-stripe. The general effect is that of a bicolor. The period of bloom at New York is throughout most of July with the climax about the 15th. The flowers are day-blooming with some fading when exposed to full sunlight in hot dry weather.

Of many selections in good bloom together at The New York Botanical Garden, this seedling was especially admired as a "red and gold bicolor" by Reverend John Allan Blair who has urged that this plant be propagated for garden culture, and has suggested that it be named the ***Festival*** daylily.

Hankow

This plant is a clone of the species *Hemerocallis fulva* which is extensively cultivated near Hankow, China, for the production of the flowers which are collected and used for food and medicine. The flowers are rather large (about 5½ inches across), wide-spreading, and rich yellowish-orange in color with a bold eye-zone

in the petals that is near jasper-red or scarlet. The period of bloom at New York has been from the middle of July well into August. Compared with the Chengtu Daylily, another of the clones cultivated in China, the flower is more spreading, the general color is more yellowish-orange and the scapes are taller. Of the numerous seedlings and cultivated clones of *Hemerocallis fulva* obtained from the Orient by The New York Botanical Garden, this is considered by many visitors to be one of the most attractive.

Plant Collecting In British Guiana

II.

By A. C. Smith

THE remaining months of my stay in British Guiana were spent in making collections under the joint auspices of The New York Botanical Garden, the Arnold Arboretum, and the Yale School of Forestry. During this period I worked in the Kanuku Mountains and the adjacent savannas, making use of a mixed but capable crew of three Arawaks, a Wapisiana, a Macusi, and a Brazilian.

The Kanuku Mountains are a belt of hills, with a maximum elevation of less than 1,300 meters, stretching across the colony from the Takutu to the Corantyn Rivers slightly north of latitude 3° N. The eastern part of the range is low, and its flora doubtless approximates that of the middle Essequibo region. West of the Rupununi, however, the terrain is more broken, with abrupt peaks and spectacular cliffs. Because of the fact that this forested mountain mass is for the most part surrounded by savanna, a considerable percentage of endemism may be anticipated. The existing forest is constituted of the same generic elements as that of the upper Essequibo basin and the Akarai Mountains, but since the area has hardly been touched botanically, future work must decide whether other geographical areas have contributed to the Kanuku flora.

In its general appearance the western mass of the Kanuku Mountains bears a striking resemblance to a Pacific volcanic island, the undulating savanna taking the place of the sea. During each of my trips along the southern face of the range I was startled by the similarity of the terrain to that of the Fijian island of Vanua Levu; the same types of peaks and ridges, the same embayments and deep creek valleys heighten the illusion.

Two principal camp sites were used as bases during my work in the region, one near the western tip of the range, distant only a few miles from the Takutu River, and one in the drainage of Moku-moku Creek, a more northerly Takutu affluent. The transition from savanna to forest is very abrupt, only a narrow belt of such woody plants as *Allophylus occidentalis*, *Casearia spinescens*, *Piptadenia peregrina*, *Cochlospermum vitifolium*, and *Vitex Schomburgkiana* intervening. Near the western extremity of the range the lower elevations, in March, were comparatively dry in appearance. Inevitably one is reminded of autumn in our northern

Savannas of the Rupununi region, with the Pacaraima Mountains in the distance.

states, as the foliage is not thick and the ground is covered with new-fallen leaves. To add an imitation of autumn leaves to the effect, there are many species of deciduous trees which at this season are covered with yellow, orange, or blue flowers. These trees appear to belong to the families Leguminosae and Bignoniaceae. At middle elevations (500-700 meters), the character of the flora changes. On rocky ledges which interrupt the forest numerous pteridophytes are found, such as *Anemia tomentosa*, *Doryopteris palmata,* and a species of *Selaginella*. Also characteristic of these ledges are cacti of the genera *Cereus*, *Cephalocereus*, and *Cactus*. The forest itself is lower than that nearer the base of the mountains. In the undergrowth one observes such attractive melastomes as *Miconia prasina*, *M. ptcropoda*, and *Clidemia aphanantha*. Among several passion flowers, *Passiflora securiclata* gives a brilliant touch to the shady forest with its long repent racemes of scarlet flowers.

There are two fairly important forest industries in the Kanuku region. The first of these, which engages the attention of many Indians and settlers during the rainy season, is the collecting of latex from the well-known balata tree (*Mimusops balata Schomburgkii* and perhaps other species). Stringent rules are enforced by the Forestry Department to prevent excessive bleeding of trees. The principal use of balata is the insulation of undersea cables. The other tree of some commercial importance is the tonka bean (*Coumarouna punctata*), the seeds of which, desultorily collected and dried by Indians, eventually find their way to a foreign market where they are used primarily in flavoring tobacco.

The savanna in the Takutu region hardly differs from that near the Rupununi. But having more leisure to become acquainted with it, I found the grassy plain really colorful as showers began to break up the dry season. Attractive and showy plants are the terrestrial orchid *Cyrtopodium cristatum,* the splendid white-flowered *Hippeastrum solandriflorum*, and the small yellow-flowered *Curculigo scorzoneraefolia.* Small subprostrate legumes abound, among them being *Grimaldia hispidula, Chamaecrista flexuosa, Indigofera pascuorum, Eriosema lanceolatum,* and *Tephrosia cinerea.*

My most interesting trip in the Kanuku region was made in the pleasant company of Father H. C. Mather, who guided me on an ascent of Mount Iramaikpang, a prominent cliff-marked peak of about 975 meters elevation, on the northwestern face of the range. Richard Schomburgk had made a brief ascent of Iramaik-pang (6: 345-349)*, and Father Mather was able to lead me to the exact spot where the famous collector had first seen *Strychnos toxifera,* the base of the widely known Macusi arrow-poison. During the first day of our three-day trip we ascended from the savanna through beautiful thick forest, crossing an inconspicuous ridge at about 600 meters and descending slightly to Komu Creek, which eventually reaches the Takutu. Beside this swift cold-water stream we pitched a camp. From this point the summit can be reached in an hour, so the second day we collected intensively and

* The figures refer to the bibliography in the first instalment, which appeared in January.

A shallow pond on the Rupununi savannas.

spent several hours on the peak, as enraptured by the view as was Schomburgk, whose graphic description need not be enhanced. The summit itself is a huge mass of granite, falling away on three sides to perpendicular cliffs. A large part of it is covered by an extensive tangle of *Pteridium arachnoideum.* On more exposed rock surfaces the moss *Campylopus savannarum* is the predominant plant. We were fortunate in finding nearly every species on the summit in good condition to collect. The area is probably typical of exposed rocky ledges at higher elevations in the Kanukus, and it is apparent that the flora of such areas is very distinct from that of the forested slopes. The bromeliad *Pitcairnia nuda,* with striking red inflorescences, is abundant. Other characteristic plants are *Chelonanthus uliginosus,* with exquisite blue flowers, the thicket-forming *Myrcia sylvatica, Clidemia dependens,* and the orchid *Epidendrum decipiens.* The upper slopes of Mount Iramaikpang support a dense wet forest of diverse character. Collections were made in this forest on the return from the summit, and after another pleasant night in our camp on Konu Creek, we returned to the savanna.

The rainy season of 1938 began a few weeks earlier than usual in the Rupununi District. During the dry season the savanna rivers are little more than series of shallow pools. But after several days' rain, during the night of May 2 the Rupununi rose more than 15 feet, and the following day we started downstream. Under the capable direction of Mr. John Melville, a fast trip was made to Rockstone, on the Essequibo River, from which point an old railroad leads to Wismar on the Demerara River. Our collections were transported along this line on flat cars drawn by a disintegrating flame-spitting tractor, the 19 miles being covered in three hours. The railroad runs through an interesting sandhill region (*2*), which Mr. Snedigar and I observed by the light of a clouded moon, feeling that our shrieking passage through this forest was the only hazardous part of the entire trip. From Wismar a river boat makes frequent trips to Georgetown, which we reached on May 11. The luxuries of the city were a welcome change, although at first I found a hotel bed unprovocative of slumber, after 234 consecutive nights in a hammock. Although Mr. Snedigar remained in Georgetown for several weeks, I left on May 22, and after a pleasant trip with many stops at the Lesser Antilles and Windward Islands, arrived at Boston on June 6.

My work in the Kanuku Mountains was necessarily very cursory, and it is to be hoped that some collector will spend at least an entire season in this area, which is of considerable importance in a study of the British Guiana flora and at the same

A forest camp in the Kanuku Mountains.

time quite accessible. By ordinary methods of transportation, the Kanuku region can be reached in less than two weeks from Georgetown. Travel on the savanna is not difficult, and thus a collector is enabled to work up numerous streams toward the interior summits. During this part of my work, 602 herbarium numbers, in sets of 15 or 16, were collected, in addition to 235 wood specimens. The wood specimens will be deposited at the Yale School of Forestry; the first set of herbarium specimens taken on the entire trip will be deposited at The New York Botanical Garden, and duplicates will be distributed to the important American and European herbaria.

In conclusion I wish to express appreciation for the assistance given by the co-operating institutions, which made possible my collections subsequent to the Terry-Holden expedition.

Although on this visit to British Guiana only the most superficial work could be done in a vast and previously uncollected area, it is the writer's hope that further collecting may be stimulated as a result of the trip.

OUTDOOR

FLOWER DISPLAYS

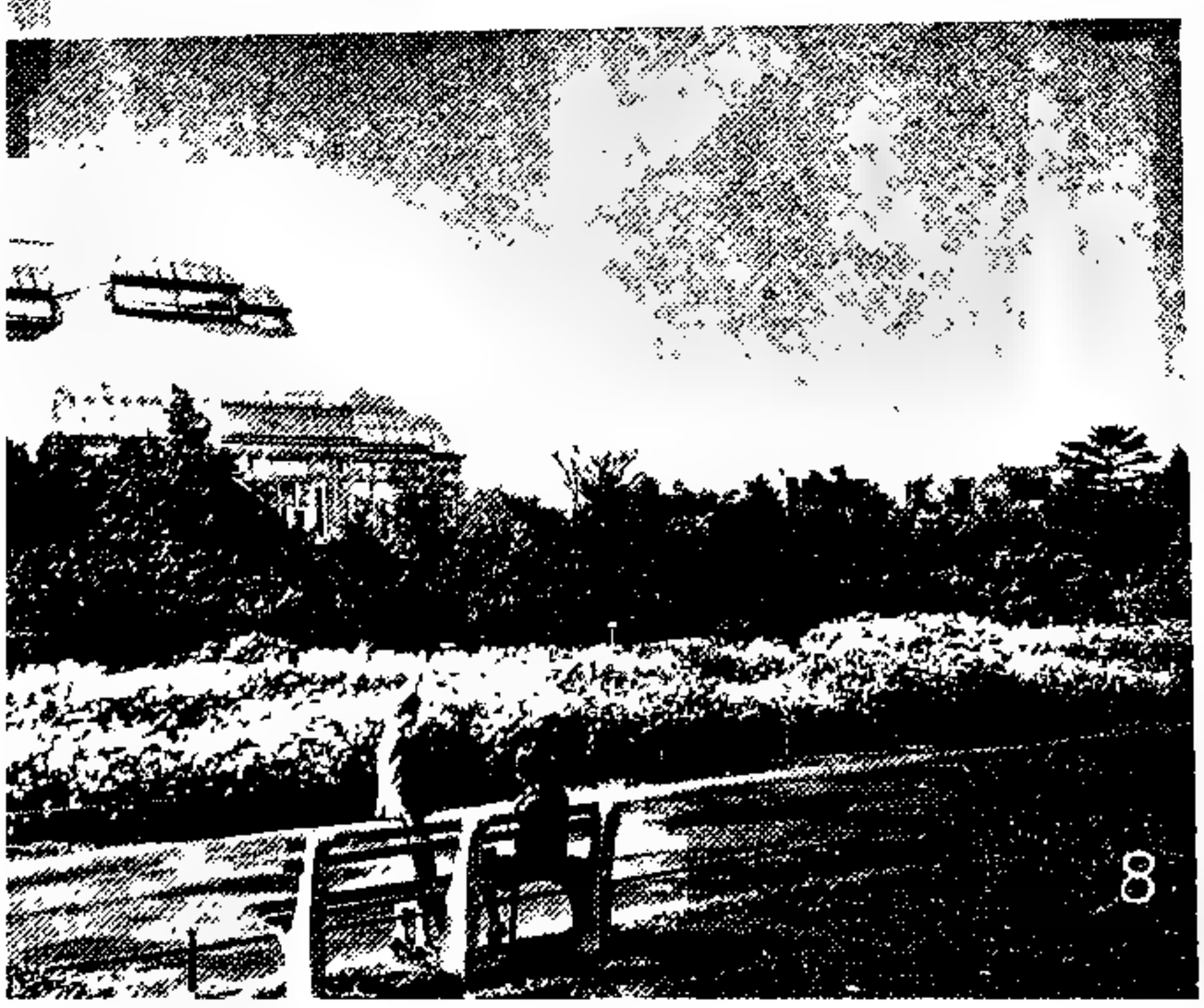
AT THE GARDEN

APRIL - NOVEMBER

ris in more than 00 varieties, late May and early une.

Spring and early ummer, the Thomp- on Memorial Rock Garden

3. *Eight thousand roses in June and many of them again in October.*



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4. *Borders of annual and perennial flowers in brilliant array all summer.*

5. *Waterlilies of the finest throughout summer and fall in the outside court of the conservatory and also at the World's Fair.*

6. *Model gardens showing a succession of bloom from spring to fall.*

7. *Dahlias in an autumn display containing 400 varieties.*

8. *Hardy chrysanthemums, following the hardy asters, and lasting until heavy frost.*

Throughout the winter and until the first of June, there is a continuous floral display of seasonal material in the conservatory.

7

Hurricane Damage To Trees In New York City

By Allyn R. Jennings,
General Superintendent of Parks

(Excerpts from Mr. Jennings' address at the Eastern Shade Tree Conference at The New York Botanical Garden December 8 and 9)

IN GOING over the records and analyzing the varieties of trees to which the most damage occurred during the hurricane of last September 21, I find that out of a total of 2,181,421 trees standing in parks, on parkways and on city streets, our loss was 12,319. Silver maples and poplars accounted for the largest majority; the Park Department is not responsible for the planting of poplars or silver maples, and does not grant permits for planting these varieties as street trees. Any which are now standing on city streets were planted by private real estate developers years ago, and when these private streets were turned over to the City the trees became a part of the care of the Park Department.

There were 3,645 silver maples and 2,946 poplars destroyed. The remainder of the varieties in the larger brackets were as follows: 651 willows, 605 lindens, 525 Norway maples, 400 cherries, 360 planes, 169 American elms, 157 locusts, 118 oaks, and 30 ashes. There are at least 30 varieties of trees growing on our streets. If silver maples and poplars, which constitute 53 percent of the total, were eliminated, the loss would have been only 4,328 trees, and this same ratio applies to trees damaged. This clearly demonstrates that these two types are not good park or street trees and their use should be discouraged as much as possible.

The Park Department has and is still making an intensive study of the better trees for park and street usage, assisted by the staff of the Botanical Garden. With this assistance added to our own experience we have reduced the roster of suitable street trees to pin and red oak, linden, Norway maple, honey-locust, London plane, American elm, tulip, and ginkgo.

We make every effort to foster street tree planting not only by giving advice on the variety of trees to plant, but also in interesting and helping various property owners and large real estate holdings with their street tree problems. This activity has met with gratifying success throughout the City and I have no doubt but that the hurricane has brought before realty owners the fallacy of planting any but sturdy growing trees in front of their property.

As a result of the storm, the Commissioner of Parks has made a request to the Board of Estimate for $275,000 to replace trees destroyed and for surgery on the damaged trees. We realize that if work on the damaged trees is not pushed ahead, these trees with open wounds, broken branches, and scarred tissue will be in a receptive state for insect and fungous attacks.

I would like to place before this meeting the colossal responsibility the Park Department has in the planting and maintenance of park and street trees. With a force of only 247 men in the Forestry Division, a total of 2,181,421 trees are cared for; 1,200,671 of these trees are in the parks, which comprise 18,830 acres, and 980,750 are street trees scattered over 5,521 miles of streets. To this total we added 67,773 trees this year which, based on average mortality of 50 years means over 50 percent more than are needed for normal replacements.

The Park Department's work involves spraying, removal of dead and dangerous trees, pruning, planting, tree surgery and other activities in connection with the care of trees. Of course, we cannot begin to solve a problem which calls, for instance, for 150,000 individual pruning jobs each year, with such inadequate forces, but by systematic geographic scheduling of our work, doing entire blocks or sections in one operation rather than a hit-or-miss schedule, we have been able to raise the efficiency of the tree divisions. We hope in time to impress on the City's budget authorities the need for a more adequate appropriation for forestry work in the City.

Dealing With Storm Damage In Central Massachusetts

By M. A. McKenzie,
Massachusetts State College

(Excerpts from the paper presented by Prof. McKenzie at the Eastern Shade Tree Conference. The entire paper will be published as Contribution No. 328 of the Massachusetts Agricultural Experiment Station, in the Proceedings of the Conference, soon to be published.)

SURVEYS of the effects of the recent hurricane on shade and ornamental trees in New England have aroused considerable speculation concerning the explanation for diverse and often apparently conflicting observations of specific tree injuries. However, all reports agree that the number of trees destroyed by the hurricane is unprecedented and the statement in the press that 100,000,000 trees were down in Massachusetts appears to be a

reasonable estimate. Not all of these trees were shade trees by any means since the forest plantings suffered heavily; but the loss of street trees as well as ornamental trees on private property was a major catastrophe.

In central Massachusetts trees were partially or completely uprooted throughout a rather wide but not unbroken area. In the town of Amherst, for example, approximately 1,000 trees on public property were uprooted or otherwise destroyed, while in the town of South Hadley about ten miles south of Amherst relatively few trees were destroyed, but the loss included the progressively weakened sycamore which stood out so prominently on the highway approaching Mount Holyoke College from Amherst. In the town of Sunderland the collapse of two huge and vigorous elms long known as landmarks on the east side of the main street left a gap to mar the tranquil beauty of this quaint New England village street. Less than a half a mile north of these elms the renowned sycamore, believed to be the largest tree of its species in Massachusetts, escaped serious injury. The destruction of sugar maples in Sunderland was sufficiently extensive to indicate a curtailment of maple syrup products next spring. On the west side of the Connecticut River just across the Sunderland Bridge in the historic town of Deerfield, locale of the early Indian massacre and now a mecca for tourists, with its frequently photographed colonial structures picturesquely framed by stately elms, considerable damage resulted to trees and buildings but fortunately the damage is not beyond repair.

When the high wind struck central Massachusetts it found the stage well set for an all-time record of tree destruction. The thoroughly soaked ground freely gave up the root systems supposedly anchored tenaciously by functional and physical laws. Rather close observation of several large trees preceding and during the process of uprooting revealed no thundering crash but rather so relatively slow and measured a fall that huge trees frequently fell with almost no audible indication and in some cases leaned over to rest against structures with a minimum of damage to buildings.

Poorly developed roots, often the result of severe pruning during road construction, poor site, or inadequate water or food, contributed materially in weakening the mechanical support of trees. However, inconsistencies with the theory that inadequate anchorage alone determined victims of the gale wind are too numerous to conclude that a good root system insured tree survival. Likewise, the existence today of many avenues of trees in the path of the hurricane which were notoriously weakened at

some time in the past by root cutting and mutilation is evidence that a combination of factors was frequently active in the destruction or survival of trees during the hurricane.

For the most part conditions since the hurricane have facilitated tree restoration work in Massachusetts. Fall planting to replace irreparable losses has resulted in much progress toward rehabilitation although much remains to be done in the way of tree repair. The optimism with which individuals and groups faced the inescapable responsibility of repairing and replacing trees is a most encouraging sign of tree-mindedness on the part of the public. Unrecorded but genuine appreciation of pleasant experiences with trees in the past has stimulated current interest in a sincere desire for tree welfare in the future.

Studies Of Root Systems Of Trees

By D. T. MacDougal
Coastal Laboratory,[1] Carmel, California

(Read by Dr. William J. Robbins at the Eastern Shade Tree Conference)

SYSTEMATIZED information as to stature and disposition of roots of trees beyond the seedling and nursery stage is very fragmentary. The trunk and crown are under constant observation and much is known as to the changes which are important in the physiology of the tree, in silviculture, timber production, and ornamental planting. Similar delineation or measurements of the development and maturity of root-systems are extremely scanty and very few generalizations may be founded upon them.

In my own studies of the Monterey pine, measurements of root-systems could be made only by excavations, at a cost of $15 to $25 per tree of an age over twenty years. A dozen large trees were thus digged out and a number which had been uprooted by storms were also available. The arrangement of the results made it possible to conclude that of the woody material constructed from the leaf-products of this pine tree as much as one-fourth or as little as one-seventh of the total amount in trunks and branches was used in the construction of the root-system.[2]

Taken in connection with dendrographic studies it became apparent that the flaring bases of trunks and the abruptedly enlarged basal portions of attached roots constituted a distinct physiological

[1] Of the Carnegie Institution of Washington.
[2] See MacDougal, Life History of a Pine Tree. Chapter VIII. Tree Growth. Leiden. 1938.

unit, or well-defined region so far as period of seasonal growth, activity of the cambium and concentration of growth-promoting substances were concerned.

Its individuality becomes more marked with age and it is to be noted that it is this mass of woody material which undergoes maximum stresses from the flexion of trunks swayed by the wind. Some of these features are reflected in the results of tests for specific gravity, crushing strength and modulus of rupture in the engineering laboratory.

Of the estimated million trees reputed to have fallen in the great storm in New England it seems highly probable that a few hundred or a few thousand representing several species have been uprooted in such manner as to render possible studies of the development of root-systems with respect to:

a. Corresponding stage of the crown.
b. Nature of the substratum or soil-formation.
c. Character of stand and associations.
d. Extent and volume of root-system.

Systematized information as to the above features would constitute a contribution of permanent value in the physiology of trees, in forestry, horticulture and in all kinds of silviculture and ornamental planting.

Definite schemes of measurement should be formulated in which the principal part of the work would be done in the field. Whatever anatomical studies were seen to be important could be carried out in the laboratory in connection with pathological work. A committee to make out a working plan and to supervise its execution should be set up as a necessary first step in the movement.

Questions of the Month

As asked and answered at The New York Botanical Garden

Clone and Variety

What is a clone?

In nursery practice and in garden culture, many plants are propagated vegetatively instead of by seeds. That is, the plant itself is divided, or cuttings are made from it, and thus it is multiplied until it eventually exists as a large number of separate members, all of which, however, no matter how many times propagation has been performed, actually are parts of the one original seedling. Such a group of plants is known as a *clone*, which is thus to be distinguished from a group of plants of a species or a true

variety, each plant of which has arisen from a seed that has resulted from fertilization. The various color forms of the birdsfoot violet are usually examples of true *botanical* varieties, and the entire botanical name should be placed in italics: *Viola pedata alba.* The color forms of the annual phlox which come true from seed are examples of true *horticultural* varieties. These are usually given a distinguishing name, such as Apricot, Fordhook Crimson, or Splendens. At the present time we cannot tell from horticultural literature whether a name refers to a true variety or to a clone. Such distinction could be shown in type—and would be desirable. The daylilies, for instance, and other perennials which have been developed by hybridization and selective breeding (or as "sports" or mutations) are *clones.* Each one may be reproduced true to type only by vegetative means. The name by which they are known approaches the status of a proper name—for example: Hemerocallis (Daylily) ***Mikado.***

The term CLON from the Greek word meaning a twig or slip was suggested for this usage by Dr. Herbert J. Webber in 1903 (Science II. 18: 501-5-6). Recently, various writers have used the spelling "clone," which more clearly requires a pronunciation with a long *o.* Further treatment of this subject appears in the Journal of the Horticultural Society of New York for July 1924 and in the Journal of The New York Botanical Garden for February 1929.

A. B. STOUT.

Olives in Ancient Egypt

At what season did the ancient Egyptians gather olives for oil?

According to the literature on the culture of olives, the seasons for picking would be as follows:

If olives are to be preserved or pickled they are picked before they are ripe, that is, in September or early October. If they are to be used for the finest grade of oil—oil of quality rather than quantity to be used for culinary and table service—they are picked in November or December. If they are to be used for poor grade of oil in which quantity is wanted instead of quality, they are picked in February and March. This is because the quantity of oil increases in the olive as it gets more and more over-ripe, but the quality decreases. Black or over-ripe olives, therefore, have more oil than green ripe ones, but of poorer taste and quality.

The Metropolitan Museum experts, who asked this question, seemed to be able to determine from the context of a papyrus for what purpose the olives were to be used, and so with the above information were able to date the chronology of their papyrus.

H. N. MOLDENKE.

Flowers in Victoria's Time

What flowers could be bought in florists' shops in London during Queen Victoria's reign?

If we may judge from a brief account in R. P. Brotherston's "Book of Cut Flowers" published in London in 1906, naming the flowers sold by London's sidewalk flower vendors and describing the style of table decoration then coming into vogue, we probably have a fair idea of what the florists offered in the London of Victoria's day. Mr. Brotherston says:

"We are indebted to Mr. Mayhew for an account of the flower trade in London in 1850-51, from which it appears that violets, wallflowers, lavender, pinks, carnations, moss and China roses, lilies of the valley, and stocks, comprised the flowers sold in the streets, the total number of bunches disposed of annually amounting to one million. It does not appear that loose flowers were in demand.

"The introduction of Russian methods of dining, which dispensed with carving on the table, brought with it a change in the domestic employment of flowers. Previously, only a centre-piece was placed on the table; then, however, a number of glass vases were employed. The flowers in use included verbenas, pelargoniums, cinerarias, fuchsias, and geraniums, the wealth of floral treasure among hardy plants having been seemingly unrecognized at this date."

ELIZABETH C. HALL.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Dr. Small's Southeastern Ferns

FERNS OF THE SOUTHEASTERN STATES. John Kunkel Small. 517 pages, illustrated, indexed. Science Press, Lancaster, Pa. 1938. $3.50.

Dr. Small's monumental general floras of southeastern United States will always stand as a tribute to his encyclopædic knowledge as a botanist, to his indefatigability as a field and herbarium worker, and to his organizing ability as a writer. His fern writing, a development of the past twenty years, represents his capacity for more sharply focused botanical interest, and his enthusiasm in the study of these plants, an enthusiasm expressed in such papers as "Florida, a Land of Ferns," and in the several fern books of which that here reviewed, Ferns of the Southeastern States, is the most extensive.

In his general floras, Dr. Small was dealing with thousands of species. In this text on ferns, as stated in the introduction, a total of 189 are included. While a relatively small number, it is, for ferns, probably larger than would be required for all the rest of the United States north of Mexico, chiefly because of the fact that peninsular Florida comprises large areas where subtropical and tropical species are at home. Despite, however, the presence of these localized species, the text covers a sufficient range of territory and climates so that fern students of northern states will find practically all the species covered in fern manuals of the northern area.

The systematic treatment is in line with Dr. Small's general working hypothesis, followed logically and consistently throughout his botanical work -the recognition as a separate species of any group of individuals which shows variation around a sufficiently well-marked central mean, and the subdivision of larger, polymorphic genera into independent genera. The validity of such a divisive policy, for species and genera, will depend finally both on point of view and consensus of opinion which later monographic studies, on a pandemic basis, may develop. Historically, progressive division of large, widespread species and genera is entirely in line with general developments in taxonomy and other fields of biology. The most numerous objections will come from the general botanist and the amateur student who may find new names replacing those which are familiar, and who, defensively, not scientifically, may rationalize their inertia. Eventually, whatever the point of view, the law of diminishing returns will operate against any too drastic subdivision of genera and species.

In the present volume, whether subdivision has been carried too far will be a matter of opinion among fern students. Actually, no very radical changes are made. The largest of all fern genera, *Polypodium* (in the old sense), is split up into generic groups which have been not infrequently proposed before. *Dryopteris* (in a broad sense) becomes four or five genera, as foreshadowed by Christensen in his general monographic treatment. *Botrychium* has its largest species, *B. virginianum*, recognized under *Osmundopteris*. Similarly, in the field of species delimitation: the segregations made will stand or fall as a result of later intensive study.

The most interesting example of species treatment is found in the recognition of new species in several genera, and the reporting of a number of tropical species not hitherto found in the United States. Dr. Small, from his collections of *Dryopteris*, describes three new species in the general group of *D. Clintoniana-Goldiana*. In view of the fact that some of these range as far north as Maryland, they are of special interest to northern fern students as possible additions to hardy gardens.

Dr. Small's enthusiasm as a collector and botanist has proved so infectious that he was able to enlist the help of the St. John brothers for the special monographic study of *Ophioglossum*, *Trichomanes*, and the marsh fern group, here separated as *Thelypteris*. They

describe as new four species in *Ophioglossum* and six in *Thelypteris* and report several tropical forms of *Trichomanes* new to Florida haunts. The work of the St. Johns is an interesting illustration of the possibilities of research in natural history and taxonomic fields of biology. Retiring from service in unrelated professions to take up residence in Florida, their interest and help enlisted by Dr. Small, they have become expert in their knowledge of the classification and distribution of Florida ferns.

In general appearance, the book is excellent, both as to type and illustration. Each species is separately pictured and given a paragraph or more of technical description, together with other paragraphs of interesting general commentary. William A. Knight contributes a chapter on the cultural habits of the more common species. Also appended are a glossary of terms besides a tabulation of distribution ranges for the included species and an extensive synonymy, this prepared by Dr. Barnhart. Of course, details of fact, subject to correction, will be discovered. The only one to be cited here is the illustration of *Azolla*, which seems unrepresentative, both as to vegetative and reproductive characters.

R. C. BENEDICT,
Brooklyn College and
Brooklyn Botanic Garden.

500 Plants for Hedge Use

HEDGES, SCREENS, AND WINDBREAKS. Donald Wyman. 249 pages, illustrated, indexed. Whittlesey House, McGraw-Hill, New York. 1938. $2.75.

Strange as it may seem, there has not, until the appearance of this volume, been available to nurserymen, landscapers, and gardeners, a book dealing with plant material peculiarly adapted for hedge-making, screens, and windbreaks. This work, prepared by one who has had opportunities for studying the subject thoroughly, is therefore opportune and bound to be helpful to many. The average gardener perhaps would be hard put if asked to name more than a dozen subjects suitable for hedges, especially for northern sections, and to such the extensive selection of plants that will meet winter conditions ranging from 5 to 50 below zero will doubtless prove surprising.

Until comparatively recent years, no experimental test plots of hedge plants were to be found in the United States, although one such plot has been in existence at Ottawa, Canada, for 50 years. Dr. Donald Wyman of the Arnold Arboretum has at that institution as well as elsewhere been able to collect much information concerning hedge-plants, and coupled with his general knowledge of hardwood plants, he has produced a volume fulfilling a long-felt want.

In its 250 pages, exclusive of numerous full-page illustrations in halftone, the work, in three parts, deals with hedges and screens and their uses, with planting and after-care instructions; a general selection of plants listed according to their suitability for various purposes: formal, informal, flowering, fruiting, evergreen, protective, topiary, low, tall, and so forth; followed by a descriptive list in alphabetical order. This list affords full information as to hardiness with the zone limit indicated. A map of North America colored to indicate the ten zones recognized by the United States Weather Bureau to have average minimum temperatures as given, enables one at a glance to ascertain whether any particular subject is likely to succeed in one's own territory. Evergreen foliage plants are also indicated. Additionally, there is a complete index which enables one to find any item discussed in the text, including names of all plants mentioned, these at a moderate estimate totaling more than 500 species and varieties.

T. A. WESTON,
Associate Editor,
The Florists' Exchange.

Art of Two Hemispheres

FLOWERS: EAST-WEST. By J. Gregory Conway in collaboration with Elnor Wallace Hiatt. Photographs by Julian Hiatt and Will Connell. 336 pages, indexed. Alfred A. Knopf, New York. 1938. $5.

Here is a beautiful book—a noteworthy addition to the growing literature on flower arrangement. The first part of the book treats of flowers in the East, and traces the development of the art as it is practised in Japan—its schools, its symbolism, its rhythm. The second part, Flowers: West, is concerned with arrangements as practised in the Occident, with the more or less recent recognition here of Japanese principles. The text is

enriched by one hundred magnificent illustrations. The masterful flower compositions have been photographed against a black background with striking success. The authors have included charts on the care, treatment, and shipping of more than 150 specific flowers. They tell us, for example, which flowers should have their stems dipped into boiling water and why, which stems should be cut diagonally, why certain plants for shipping must be packed dry and others moist. For the florist and for those who are exhibiting flowers, this is information of value. Some critics might quarrel with Mr. Conway's occasional crowding of flower heads at the mouth of the receptacle. Included in the book is a group of original table centerpieces for festive occasions, some amusing, others dignified. The publisher has produced a format of great distinction, which should classify this book among the "fifty best books of the year."

HARRIET K MORSE

Brief Notes on Varied Books

England

HISTORIC GARDENS OF ENGLAND. The Lady Rockley (Alicia Amherst). 260 pages, 96 plates. Scribner, New York, 1938. $3.

Under her maiden name of Alicia Amherst, The Lady Rockley has become familiar to many readers who have enjoyed her "History of Gardening in England." She has also appeared in print under the name of Lady Evelyn Cecil.

In the present volume she attempts to give, not a visitor's handbook, but a brief historical guide which shows how gardens in England have developed from the old yew hedges of several centuries back to the floriferous gardens of today with their plants from many faraway lands. A few brief chapters of text which trace the changes through the centuries are followed by nearly a hundred excellent photographs, each one with a description of the estate on the opposite page.

Wild Life

FEATHERS AND FUR ON THE TURNPIKE. James R. Simmons. 148 pages, illustrated with tables and photographs. Christopher, Boston, 1938. $1.75.

Speed of automobiles plays an important part in this small volume on the conservation of feathered and furred animals. The author makes an impassioned plea to motorists to learn to appreciate the wild life that borders on the highway and to protect it by careful driving when it enters the open space of the road. In the second half of the book Mr. Simmons discusses forestry and conservation practices and appeals for greater correlation among these branches of work which deal with the natural wild life of the country.

Plant Lore

ROOTS. Their Place in Life and Legend. Vernon Quinn. 230 pages, illustrated with drawings by Marie Lawson, indexed. Stokes, New York, 1938. $2.

Replete with lore and superstition in the quaint language of an earlier day, the third number in Vernon Quinn's series—first Seeds, then Leaves, now Roots and their place in life and legend—tells of the curious uses of close to 300 different roots. Tales have been drawn from American Indian lore and from the early peoples on every other continent. Stories are given of edible roots, poisonous roots, roots used as drugs, and other topics, all illustrated with picturesque line drawings.

Hawaii

FLORA HAWAIIENSIS. Otto Degener. Third century. 310 pages, 123 full-page plates, loose-leaf, in board covers. Published by the author at 2220 University Avenue, Honolulu, Hawaii, 1938. $3.50.

The indefatigable work of Otto Degener continues, as he proceeds, in his original loose-leaf style of manual, to illustrate and describe every fern and flowering plant that grows wild in Hawaii. The third volume—or century—contains more than the usual 100 plants, which are to be fitted into the place assigned, according to family and genus, among the plates and descriptions already published. Thus no systematic order is kept in the treatment, but as each volume appears, the whole may be united in the prescribed taxonomic order. Travelers who are interested in the plants they see, as well as scientists to whom the descriptions and synonymy are significant, will find Mr. Degener's work of value to them. The present volume, in which Doctors Earl E. Sherff, Charles Baehni, Leon Croizat, and the late Leo D. Whitney collaborated, contains 27 species and

22 varieties or forms which are either entirely new to science or are being published for the first time in what the author calls "necessary or desired new combinations."

Ecology

AN ECOLOGICAL GLOSSARY. J. Richard Carpenter. 306 pages, bibliography, and appendix of maps and tables. University of Oklahoma Press, Norman, Okla. 1938. $4.

From *abertos* meaning "hardy" to *zufällige* meaning "accidental species," Dr. Carpenter gives a bewildering compilation of terms which have been picked up in forty years of ecological literature, chiefly in English but some from articles in German which English-speaking scientists are expected to read. Author references are given, and at the end there is a list of the publications cited and a historical bibliography. The book contains approximately 4,000 terms.

CAROL H. WOODWARD.

Current Literature At a Glance*

By Virgene Kavanagh

Flower Prints. New books that are very welcome in the library are "Flower and Fruit Prints" by Gordon Dunthorne and "Floralia" by June Rainsford Butler. Few of us have an opportunity to study the originals of the seventeenth and eighteenth century books on flowers and gardening, so these volumes give us a glimpse and a new understanding of the period in which informal gardening developed.

Laws. Richard P. White discusses several of the inconsistencies and inconveniences of the existing regulations for plant exchange and suggests a joint State-Federal control and a general revamping of restrictions to insure better quarantine and less interference.—"Regulatory Laws and State Boundaries" in the *Florists' Exchange*, Dec. 31, 1938, and Jan. 7, 1939.

Classification. Herbert F. Copeland suggests that "organisms can be arranged naturally and more conveniently" in four kingdoms: *Monera,* organisms without nuclei, including the bacteria and blue-green algae; *Protista,* chiefly unicellular forms with nuclei, including flagellates, rhizopods, sporozoans, infusorians, diatoms, red algae, brown algae, and fungi; *Plantae,* organisms having plastids containing chlorophylls A and B, carotin and xanthophyll, and producing starch and cellulose; and *Animalia,* multicellular, diploid, and holozoic organisms, the metazoans. -"Kingdoms of Organisms," Quarterly Review of Biology, December 1938.

Tropical. The Seventh International Congress of Tropical and Subtropical Agriculture will be held March 13-17, 1939, in Tripoli.

Project. The Flushing Garden Club has published a list of names and locations of noteworthy plants in the area in "Shrubs and Vines of Flushing, Long Island" as a project for 1938.

Static. To overcome static when sectioning with a microtome, trim the block after it has been mounted on the upper and lower edges as it will lie in the microtome, dip it in hot soft paraffin, cool it, and trim the ends of the block. The soft paraffin holds the sections together so the ribbon is not broken by the static attraction.—*The Teaching Biologist,* January 1939.

Mississippi. Southern travelers who are interested in the plants they see will find valuable reference in Bulletin 32 of the Mississippi State Geological Survey, in which Calvin S. Brown enumerates and describes the flowers of Tishomingo State Park. The park's geology is treated by William C. Morse, Director of the Survey.

Conservation. Designed to fit into a general science or biology curriculum, "Our Nation's Forests" by Rosalie Edge, with an introduction by Harold L. Ickes, comprises Unit 6 of the conservation publications of the Emergency Conservation Committee of New York at 734 Lexington Ave. Programs for forest conservation and replacement are emphasized and a bibliography of available publications is presented.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Notes, News, and Comment

International Flower Show. Begonias in about 150 varieties will be shown by The New York Botanical Garden at the International Flower Show March 13-18 in Grand Central Palace, New York. These will represent the Garden's collection of some 300 species and varieties, one of the most complete collections in the United States. Extensive research has been done on begonia nomenclature at the Botanical Garden, and each plant in the show will be labeled. The Journal for March will feature begonias and will give a brief description of every variety and species at the flower show

For Flower Show Exhibitors. The opening lecture in the spring series at the Garden will be given by George Gillies, Superintendent of the Marshall Field estate, and will deal with the preparation of flower show exhibits, both horticultural and decorative. Mr. Gillies has been a consistent prize-winner for many years at the International Flower Show in New York. Cut flowers and specimen plants as well as full-sized gardens, which are always one of the leading features on the main floor of the show, have brought him the highest honors year after year.

The lecture will be given in the Museum Building on Saturday afternoon, March 4, at 3 o'clock, and will include suggestions for table decorations, for which he has also been awarded many prizes.

The rest of the spring program will be announced in the Journal for March.

Annual Meeting. New names were added to the Board of Managers, the Corporation, and the Advisory Council of The New York Botanical Garden at the annual meeting held Jan. 12 in the office of Joseph R. Swan, President. Mrs. Harold I. Pratt was elected to the board in the class of 1940. All members in the class of 1939 were elected to succeed themselves for a period of three years. Mrs. Warren Kinney, Mrs. Gilbert Montague, and Mrs. Antonie P. Voislawsky, who were chosen last spring to the Advisory Council, became members of the Corporation at the annual meeting. Mrs. Thomas M. Debevoise, Mrs. Arthur Hoyt Scott, and Mrs. William Felton Barrett were elected to both the Advisory Council and the Corporation during the meeting. Mrs. Arthur H. Sulzberger and Nelson M. Wells were made members of the Corporation.

Service. Curious are the ways in which The New York Botanical Garden is called into service when botanical information is needed. On the Sunday in December following the suicide of the man known as F. Donald Coster, a police reporter brought to the Garden a small fragment of a plant which had been found in the pocket of the late president of McKesson-Robbins and Company. Dr. H. N. Moldenke, who was on duty that day, identified the scrap as the common English ivy, *Hedera Helix,* and provided the reporter with numerous references from the library detailing pharmaceutical uses for the plant.

Garden Book Week. Co-operating with publishers, booksellers, libraries, and garden clubs that are uniting in sponsoring a nation-wide Garden Book Week, March 5-11, The New York Botanical Garden will place on display in its library a selection of recent garden books. The library staff will be prepared to answer questions about the usefulness of each book in its field. Elizabeth C. Hall, Librarian, has been appointed as one of the judges of window displays of garden literature in bookstores, for which the sponsors of Garden Book Week are awarding prizes. The value of building up a garden library will be stressed during the week

Journal Binding. Subscribers who wish to preserve their Journals for the past year may have them bound, by special arrangement, for a nominal sum—one dollar plus postage.

The binding will be of the highest standard, good quality, boards covered in full green cloth, lettered in genuine gold. *To have a volume bound, the entire set should be wrapped in corrugated boards and mailed directly to* Dess & Tallan Company, Inc., 217 East 144th St., New York City. The work will be promptly done and a bill will be sent before the bound volume is returned to the owner. Missing copies of the Journal will be supplied by the Garden at ten cents apiece. The entire set should be mailed to the bindery in one package.

THE NEW YORK BOTANICAL GARDEN

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, annually, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twenty-first volume. Subscription price, $10 a volume (four years). Not offered in exchange. Free to members of the Garden.

Journal of The New York Botanical Garden, monthly, containing notes, news and non-technical articles. Subscription, $1 a year; single copies 10 cents. Free to members of the Garden. Now in its fortieth volume.

Mycologia, bimonthly, illustrated in color and otherwise; devoted to fungi, including lichens, containing technical articles and news and notes of general interest. $6 a year; single copies $1.25 each. Now in its thirty-first volume. Twenty-four Year Index volume $3 in paper, $3.50 in fabrikoid.

Brittonia. A series of botanical papers. Subscription price, $5 a volume. Now in its third volume.

North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. Planned to be completed in 34 volumes, each to consist of four or more parts; 87 parts now issued. Subscription price, $1.50 per part; a limited number of separate parts will be sold for $2 each. Not offered in exchange.

Contributions from The New York Botanical Garden. A series of technical papers written by students or members of the staff, and reprinted from journals other than the above. Price, 25 cents each, $5 a volume. In the fourteenth volume.

Memoirs of The New York Botanical Garden. A collection of scientific papers. Volumes I-VII. Titles on request.

Direct all orders to The New York Botanical Garden, Bronx Park, New York, N. Y.

* * *

DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

March, 1939

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FLOWER SHOW

At the International Flower Show in Grand Central Palace this month, The New York Botanical Garden is exhibiting one of the largest collections of begonias that has ever been assembled for such an occasion. The beauty of these plants and the awakening of interest in their horticultural uses have been factors in the choice of begonias for the display.

Some of the species and varieties which will be seen at the Flower Show are extremely rare in cultivation, and more than one has been raised from seeds received directly from the wild. Many plants have been acquired from private or commercial growers and others from institutions which thus co-operate with the Botanical Garden in its aim of making a thorough study of begonias, including special research on nomenclature.

Of the thousands of spectators who will view this exhibit, many will come in the spirit in which they attend an art exhibition or opera—as an esthetic, perhaps an emotional, experience. Others will be there for such a practical reason as an interest in better gardening, whether it be a business or a hobby or whether carried on in the open, in a greenhouse, or on a window-sill. Some will attend mainly to make scientific observations.

The Botanical Garden's exhibit should have something of value to offer to every one of these persons.

The astounding diversity in begonias will be seen in the selected group of magnificent plant specimens to be shown. Covering more than 400 square feet of space, with each plant clearly labeled, this large collection will offer an opportunity for the study and comparison of many different begonia types.

The display will serve, it is hoped, as a pleasant introduction between the people and the Botanical Garden. In representing one of the institution's activities, it exemplifies the effort to gratify the interests of the flower lover, the amateur gardener, commercial grower, plant specialist, botanist, and the general public.

JOURNAL
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THE NEW YORK BOTANICAL GARDEN

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The Collection Of Begonias Grown At The New York Botanical Garden

By T. H. Everett

Because of the wide interest in begonias at present and because of the large collection which the Botanical Garden is exhibiting this month at the International Flower Show, this special material on begonias has been prepared. Visitors to the Flower Show will find here, besides directions for culture, a brief description and record of origin, so far as known, of each kind in the exhibit and of others now being grown at the Garden. Other readers should find these descriptive notes a useful guide to the begonias which they may be interested in growing. Additional material on different types of begonias will appear in this Journal later in the year. -C. H. W.

Brief Notes On Their Culture And History

FOR many years there has been a great horticultural interest in begonias and the New York Botanical Garden has accumulated in its glasshouses a large collection, many of which will be exhibited at the International Flower Show in New York City March 13 to 18. This display will consist chiefly of the fibrous-rooted kinds and will not include certain other sections, such as the Christmas begonias, the Clibran types and the large-flowered tuberous varieties, which are not in condition for exhibition during March. These may be seen on display at the Garden at appropriate seasons.

The fibrous-rooted begonias are of particular interest to the amateur for here are found the varieties best suited for cultivation in a small greenhouse, sunroom or window garden. With remarkably few exceptions they are easy to grow. Most succeed best when given a night temperature of about 55 degrees with a daytime rise to 60 or 65 permitted, but some few demand warmer conditions. All appreciate a moist but buoyant atmosphere; a stagnant, saturated air is harmful. Best adapted for growing under somewhat arid conditions, as in a house, are those having thick rhizomes or stout, erect stems and fleshy leaves as Bunchii, caroliniaefolia, Feastii, Gilsoni, heracleifolia, incana, manicata, Mrs.

Mary Peace, Mrs. Townsend, nelumbiifolia, Paul Bruant, phyllomaniaca, ricinifolia, speculata, Templinii, venosa, and Verschaffeltiana.

These kinds also like a rather heavier soil than is recommended for the majority of fibrous-rooted begonias, which prefer a light, humusy mixture. The potting compost for established plants is composed of good loam, leafmold and sand with the addition of about one-eighth of its bulk of dried cow manure and bonemeal at the rate of a pint to a bushel of soil. For newly rooted cuttings the fertilizers should be omitted and extra sand added. The soil must be made only moderately firm, not packed hard. Good drainage is essential. Repotting should receive attention at the beginning of the growing season and as often thereafter as the plants fill their receptacles with roots until about a month before flowering time, when feeding with dilute liquid fertilizer is substituted.

With the exception of the semperflorens varieties, all fibrous-rooted begonias should be afforded shade from strong summer sunshine, but most of them respond to full exposure from late October to February. Those with thin leaves and those which naturally grow in heavy shade, such as "braziliensis," cathayana, Engleri, goegoensis, imperialis, olbia and Rex-cultorum are more susceptible to sunburn than others.

The watering of begonias requires care, for the soil must be maintained always in a pleasantly moist condition but must not be permitted to stagnate. Sufficient water should be applied at one time to saturate thoroughly the whole ball of soil and it should be at room temperature. Begonias are particularly impatient of drafts and sudden changes of temperature.

The vegetative propagation of these plants is very simple. Stem cuttings, afforded close atmospheric conditions, root readily in moist sand and some kinds can be easily increased by means of leaf cuttings. Seed is in some cases available. It is minute and should be sown on the surface of carefully prepared seed pans without any covering of soil. A sheet of glass is placed over the pan to conserve moisture and the receptacle is shaded. Dryness or exposure to strong sunlight is fatal. Begonias are not particularly subject to disease or insect pests. The most common enemies are mealy bugs, aphids and mites. These are controlled by sponging or spraying periodically with an approved nicotine insecticide.

A Franciscan monk and botanist, Charles Plumier, first applied the name Begonia to this genus. He named it in honor of his traveling companion, Michel Begon. The genus was first described by Tournefort in 1700. Since that time more than 1,300 species have been described as existing in nature but some of these

names undoubtedly are synonyms. Begonias are indigenous through most of the moist tropical and subtropical zones and extend to high altitudes in the mountains. Their chief centers of distribution are India and the warmer parts of America.

Only a small minority of the natural species have ever been introduced to cultivation but these have served as a stock from which numerous hybrids and varieties have been developed so that more than 2,500 names have been used in horticultural literature. The names which are and have been applied to cultivated begonias during the last century or more are greatly confused, and one of the purposes that the New York Botanical Garden collection serves is as an aid in untangling some of this confusion. Research of this nature is carried on continuously at the Garden.

The Species And Varieties

THE following descriptions of begonias raised at The New York Botanical Garden are of species and varieties from which will be selected the plants exhibited at the International Flower Show. Every effort has been made to present this information accurately, and I am indebted to Mrs. H. H. Buxton, Mr. C. M. Kelly, Mr. Theodore Gruenbaum, Mr. A. D. Robinson and Mr. Rudolph Ziesenhenne for assistance in securing information regarding the origin of American-raised varieties. Mrs. Hildegard Schneider has carried out much of the necessary research work involved and has ably assisted in the preparation of the descriptions.

The names of plants accepted as true species are given in the customary lightface italics; names of plants of horticultural or uncertain origin are in boldface type. The word "raised" as used in the phrase "Raised in California" indicates the place of origin of the variety to which it refers. The numbers in parentheses indicate the dates of introduction into cultivation.

Begonia Descriptions

Abel Carrière—(*B. Rex* x *B. Evansiana*) medium; stems and branches much swollen at base; leaves broad-ovate, silvery; flowers deep pink. A handsome hybrid of French origin.

acutangula—similar to *B. angularis* but with larger and broader coarse-toothed leaves, pale green veins. Received from Kew 1937. Listed as "acutangularis."

Alleryi (*B. metallica* x *B. gigantea*) medium, bushy, hirsute; leaves ovate, irregularly toothed, dark green; veins beneath purple; flowers pale pink, summer. Of French origin. Received from Kew 1935.

andina—(Bolivia) medium, whole plant covered with a brown scurf; stems rather weak; leaves ovate, pointed, fleshy, dull green; flowers white. Discovered by Mr. R. S. Williams of The New York Botanical Garden in 1902.

angularis—(Brazil) medium, smooth; branches many, spreading or drooping; leaves ovate-acuminate, green, veins gray; margins undulate, serrate; flowers said to be small and white. Listed as "Zebrina."

Argentea-guttata—(*B. albo-picta* x *B. olbia*) medium, much branched; leaves ovate-acuminate, slightly lobed, green heavily spotted silver; flowers cream tinged pink, partly hidden in foliage. A French hybrid. Well known and of easy culture. The "Trout" begonia.

Arthur Mallet (*B. subpeltata* x ***Eldorado***) medium, freely branched, hirsute; leaves ovate, metallic purple particularly when young, becoming leaden with age; flowers decorative, clear pink. Raised in France. Very distinctive. Received from Kew 1937.

Bayern—low, bushy, glabrous; stems erect, branched; leaves ovate, dentate, green, silver-spotted; flowers many in drooping cymes, pink. Similar to ***Sachsen*** and ***Preussen*** but with silver-spotted leaves. Probably of German origin.

Bellagio—(***Lucerna*** seedling) medium, smooth; stems cane-like; leaves ovate, dark green, red beneath; flowers pink. Raised in California. (1934)

"*braziliensis*"—an unidentified species which is commonly incorrectly named *brasiliensis*. Rhizomatous, hairy; leaves nearly round, bright green, rugose; inflorescences tall, erect, nodding in bud; flowers white. Requires high temperature.

Bunchii -a sport of ***Feastii*** with crested leaf-margins. Originated in Fredonia, Kansas.

caroliniaefolia — (Mexico) medium; stems very thick, erect, rarely branched; leaves palmate; leaflets 6 to 8, elliptic, fleshy, glossy; flowers clear pink in long drooping inflorescences.

cathayana—(China) low, softly hairy; stems erect, red; leaves ovate, long-pointed, olive-green with silver band paralleling margin; veins crimson; flowers orange-vermilion.

Chiala tall; stems and under sides of leaves hairy; leaves ovate, toothed, dark green, red beneath. Has not bloomed at Garden. Raised in California. (1930)

coccinea—(Brazil) tall, smooth; stems from base cane-like, laterals much weaker; leaves short-petiolate, ovate-oblong, light green; flowers large, numerous in large drooping cymes, bright coral-red. This is the *B. rubra* of gardens and is the type of the "Angel Wing" begonias of which many splendid named varieties are in cultivation.

Codelargo—(***Lucerna*** seedling) medium, smooth; stems erect; leaves ovate, attenuate, olive-green heavily spotted silver, toothed; inflorescences drooping; flowers large, pink. Raised in California. (1934)

"*Compta*"—Presumably a seedling of *B. angularis*, differing in having narrower leaves with the veins much more silvery and the under surface bright red. A species of this name is listed in Index Kewensis.

Corbeille de Feu -(*B. semperflorens* x *B. fuchsioides*) tall, much branched; leaves small, broad-ovate, not cordate, shallowly crenate, glossy green; flowers in drooping cymes, bright coral-red; very floriferous and of easy culture. A French hybrid. (1891) Listed as "Bertha de Chateau Rocher," "Ascotiensis" and "Vesuvius."

Credneri (*B. Scharffiana* x *B. metallica*) medium, bushy, softly hairy; leaves ovate, olive-green, reddish beneath; flowers pink, hairy without. Summer.

Cypraea—(*metallica* seedling) medium, white-pilose; leaves ovate, olive-green with darker veins, shallowly lobed and slightly toothed; flowers large, white or pale pink, pink-bearded without. Summer.

diadema—(Borneo) tall; stems erect, swollen at base; branches upright; leaves deeply and irregularly palmately lobed, dark green with silvery blotches; veins paler; inflorescences drooping; flowers large, pink. Likes a warm temperature. (1881)

dichotoma (Venezuela) tall; stems stout, semi-succulent; leaves large, pubescent, cordate orbicular, shallowly angled, green; flowers small, white, in many-flowered erect inflorescences.

dichroa—(Brazil) low; stems spreading; leaves broad-ovate, pointed, glossy green; inflorescence dense; flowers large, tangerine-orange, fall and winter. A slow grower. (1906)

Dielytra -a *coccinea* variety with blush-pink flowers. (1930)

Digswelliana—(*B. fuchsioides* x *B. semperflorens*)? low, freely branched; leaves small, fleshy, elliptic-ovate, irregularly bi serrate, shining, dark green; flowers rosy-scarlet; floriferous over a long period. Raised in England. Listed as "Sandersonii" and "Sandersii."

dominicalis — (Domin'ca) medium; stems requiring support; leaves ovate, the lowermost drooping, glossy green; margins slightly toothed; inflorescence composed of numerous very small greenish-white flowers.

Dorothy Grant—tall, vigorous, pubescent; stems many, erect, branched; leaves large, ovate, dark green, glossy, beneath deep red; inflorescences few, small, dense; flowers white or light pink with red beard without. Summer. Raised in California. (1928)

Dregei—(South Africa) medium, glabrous, tuberous; stems annual, much branched; leaves small, thin, ovate, shallowly lobed and toothed, light green with purple veins; inflorescences about 5-flowered; flowers white. (1836)

Druryi -(***Cypraea*** x *B. sanguinea*)? tall, branched; leaves ovate, pointed, dark green, red and hairy beneath. Has not bloomed at Carden. Raised in California. (1932)

echinosepala — (Brazil) medium, hirsute; stems erect, much branched; leaves pointed-ovate, coarsely toothed, glossy green; veins darker, purple beneath;

Abel Carrière, an outstanding begonia hybrid from France, characterized by the silver coloring of its pointed leaves

flowers delicate pink, pink-bearded without. Summer. Easy and decorative. (1870) Received from Kew 1935.

Elaine—(*Lucerna* seedling) tall, smooth; stems cane-like with spreading branches; leaves lanceolate-oblong, concave, undulate, serrulate, black-green, faintly spotted silver, beneath rich red; flowers pink. Origin, California. (1928)

Englcri—(Tropical Africa) tall; stems succulent, sparsely branched, green with purple spots; leaves ovate, coarsely toothed, scabrous, green; veins purplish; flowers in arching flat panicles, clear pink. A delicate species requiring a warm temperature. (1904) Received from Kew 1931.

Evansiana — (Orient) tuberous, low, smooth; stems annual, forming axillary bulbils; leaves ovate-acute, green, veined purple beneath; flowers pale pink. Hardy or nearly so at New York. (1804) Listed as "discolor."

Faureana (Brazil) tall, glabrous; stems erect, few-branched, much thickened at base; branches erect; leaves large, deeply palmately lobed, green splashed with silver; flowers large, white. (1892)

Feastii -(*B. manicata* x *B. hydrocotylifolia*) low, stems rhizomatous; leaves fleshy, orbicular, smooth, green, red beneath; inflorescences erect, pyramidal; flowers numerous, drooping, clear pink. Commonly known as the "Beefsteak" begonia. Easy to grow and very decorative.

"Florida Species" an unidentified plant commonly listed under this name. Medium; stem stout, erect; leaves ovate-orbicular, green, softly hairy; inflorescences erect, large; flowers large, white. Handsome.

foliosa — (Colombia) medium, smooth, bushy; stems arching or drooping; leaves small, ovate, bronzy-green; inflorescences three-flowered; flowers small, white or pale pink. A distinctive plant of fern-like appearance. Excellent for baskets.

Frieda Grant –medium, bushy, pubescent; leaves lanceolate, ovate, dark green, red beneath; margins undulate; inflorescences few, flowers pink, hairy without. An attractive foliage plant. Raised in California. (1928)

fuchsioides (Mexico) tall, smooth; stems erect, branched; leaves small, ovate, glossy green; flowers drooping, crimson-scarlet, decorative.

Gilsoni—medium; stems stout, erect, branched; leaves ovate-attenuate, shallowly lobed, dentate, green, glossy; petioles and veins beneath hairy; inflorescences erect; flowers numerous, males double, pink. Originated in New York about 1880.

glaucophylla -scandent; stems slender; leaves ovate, cuneate, undulate, glossy green; male flowers numerous but do not open with us, coral-pink, glossy. A good basket subject. Listed as "glaucophylla scandens."

Gloire de Jouy—low, bushy; leaves ovate, slightly lobed, silvery, densely covered with dull gray-green spots, rough-hairy; flowers soft pink deepening at center. Slow-growing. Received from Kew 1935.

gogoensis (Sumatra) low, rhizomatous; leaves orbicular, peltate with quadrangular petioles, dark olive green with paler veins; inflorescences loose, erect; flowers pink. Requires tropical temperature. (1882)

Haageana — (Brazil) medium, softly hairy, bushy; leaves large, ovate, light olive-green, red beneath; flowers in drooping inflorescences, pale pink, hairy without. Summer. A good decorative plant

Helen—medium; stems erect; leaves ovate-acuminate, green; margins toothed, crinkled; flowers in drooping cymes, greenish-white. (1928)

Helen W. King –(***Lucerna*** seedling) tall, smooth; stems cane-like; leaves ovate-lanceolate with large basal lobe, red-olive-green, silver-spotted, red beneath; flowers clear pink. Raised in California. (1920)

heracleifolia — (Mexico) rhizomatous, hairy; leaves large, deeply lobed to more than half their diameter, green; inflorescences tall, erect; flowers numerous, pink, decorative. The "type" of the "Star" begonias.

heracleifolia nigricans—a variety with black-green leaves and paler veins.

hirtella—(Brazil) low, bushy, hairy; leaves small, broad-ovate, green; flowers small, greenish-white. Of no decorative importance.

imperialis—(Mexico) rhizomatous, low, hairy; leaves cordate, brownish with green veins, velvety; inflorescence few-flowered; flowers small, white. Choice. Requires warm conditions.

imperialis smaragdina—a variety with emerald-green leaves.

incana—(Mexico) medium, whole plant densely white-scurfy; stems thick, erect; leaves fleshy, peltate; inflorescences arching; flowers numerous, drooping, white. Very distinctive. Listed as "peltata."

incarnata (Mexico) low; stems erect, much branched; leaves small, ovate, toothed, light green; inflorescences few-flowered; flowers pink. (1827)

Ingramii—(*B. nitida* x *B. fuchsioides*) tall, bushy; leaves small, ovate, toothed, sparsely hairy, glossy bronzy green; flowers deep pink. Often grown as "B. robusta." Of English origin. (1849)

Interlaken – (*Lucerna* seedling) tall, smooth; leaves ovate, acuminate, undulate, with pointed basal lobes, green, faintly spotted; flowers dull red-brown. Raised in California. (1934)

isoptera—(Java) low, smooth; stems erect, branches spreading; leaves ovate-oblong, convex, shining green; margins red, toothed; inflorescences terminal; flowers inconspicuous, greenish edged pink; an unusual species for the collector. Received from Kew 1935.

Jinnie May—low, bushy, smooth; resembling ***Bayern, Sachsen*** and ***Preussen*** but with bronzy-salmon flowers. Leaves not spotted. Originated in California. (1925)

Kewensis — tall; stems cane-like, branches spreading; leaves ovate-acuminate, green; inflorescences pendulous, flowers greenish-white. English origin.

Lady Lou—(*coccinea* seedling) tall, smooth; stems erect; leaves ovate-lanceolate, green; margins shallowly dentate, undulate; flowers large, blush-pink, in many-flowered cymes. Raised in California. (1934)

Lecco (*Lucerna* seedling) medium; stems erect with weaker branches; leaves oblong-ovate, olive-green, with silver spots, silver at apex, red beneath; inflorescences drooping; flowers large, deep pink. Origin, California. (1934)

lobulata—(Mexico) tall; stems erect, few-branched; leaves large, broad-ovate, shallowly lobed, glossy green, finely toothed, brown-tomentose beneath; inflorescences erect, many-flowered; flowers white or pale pink. Handsome. Raised from seed collected in Chiapas for The New York Botanical Garden by T. MacDougall.

longipes petiolata—stems stout, erect, succulent; leaves with long red petioles, ovate, green, bristly-hairy; flowers small, white, in erect many-flowered inflorescences. Received from Kew 1938.

Lucendro (*Lucerna* seedling) medium, smooth; stems erect, cane-like with weaker branches; leaves pointed-ovate, green freely blotched with silver; apex silver; flowers large, pink; ovaries white with pink wings. Raised in California. (1934)

Lucerna—(hybrid) tall, smooth, vigorous; stems erect, cane-like, with weaker branches; leaves large, ovate, olive-green, silver-spotted, red beneath; margins toothed. Inflorescences very large, drooping; flowers large, carmine; ovaries white with pink wings. One of the best. Often grown as "Coralline Lucerne." Raised in Switzerland.

Lugano — (*Lucerna* seedling) tall, smooth, branched; leaves with a sharp-pointed basal lobe and coarsely toothed margins, dark green, faintly spotted silver; flowers yellowish pink. Raised in California. (1920)

luxurians (Brazil) tall, pubescent; stems erect; leaves large, compound, palmate; leaflets to 16, narrow-elliptic, green, serrate; flowers inconspicuous, white in erect inflorescences. Very distinctive. (1846)

Macbethii A variety of *Dregei* of more compact habit and with smaller, more deeply lobed leaves.

"Machu Picchu" — An undetermined plant raised from seed collected at the ruins of Machu Picchu, Peru. Medium,

branched, smooth; leaves broad-ovate, green; flowers lavender-pink in dense inflorescences; superficially resembling *nitida* but male flowers dipetalous. Very floriferous. (1936)

maculata (Braz.) tall, smooth, with habit of *B. coccinea* but leaves plainly marked with silver spots. Flowers pink.

maculata Wightii—a distinct variety of bushy habit with concave leaves freely spotted silver; flowers greenish white. Received from Kew in 1935.

Madame de Lesseps -(***Argentea-guttata*** x *B. olbia*) tall, stout, erect, freely branched; leaves large, ovate, lobed and toothed, olive-green spotted silver, red beneath; flowers greenish, flushed pink. Summer.

Madame Fanny Giron –(*incarnata* hybrid) low; stems branched; leaves ovate-attenuate, toothed, green; flowers bright crimson. Raised in France. (1875)

Maggiore — (***Lucerna*** seedling) very similar to ***Lucerna*** but with rather smaller and unspotted leaves. Origin, Calif. (1934)

malabarica (Malabar) low, bushy, pubescent; leaves small, ovate, toothed, green; inflorescences short; flowers drooping, blush-pink. Received from Botanic Garden, Hamburg, 1935.

manicata - (Mexico) medium; stem stout, erect; leaves ovate, fleshy, smooth, green, toothed with collar of coarse hairs at top of petiole; inflorescences tall, erect, profusely flowered; flowers soft pink, drooping. Very fine. (1837)

manicata aureo-maculata a variety with yellow-blotched leaves.

manicata crispa—a variety with crested leaf-margins.

Margaritacea related to ***Arthur Mallet*** which it closely resembles, but differs in that the leaves are duller and of more leaden appearance. Flowers pink.

Margueritae -(*B. echinosepala* x *B. metallica*)? medium, bushy, softly hairy; leaves ovate, slightly lobed and toothed, olive-green; veins purple beneath. Flowers pink, hairy without, summer. Raised in France. (1883)

Marjorie Daw (*B. coccinea* x *B. glaucophylla*) smooth; stems many, lax; leaves triangular-ovate, bright green, slightly sinuate; inflorescences many-flowered, drooping; flowers large, clear pink. A good basket variety. Raised in California. (1900)

Mary –a pink-flowered *coccinea* variety with red-purple petioles and leaves sometimes silver-spotted. Raised in California. (1930)

May Queen—a *coccinea* variety with pale greenish white flowers. Raised in California.

Medora—medium, bushy; stems slender, much branched; leaves small, triangular-lanceolate, glossy dark green, heavily spotted silver; margins toothed and waved; inflorescences drooping, few-flowered; flowers pink; ovary wings deeper pink. Not free-flowering. Originated in Medora, Ill. (1926)

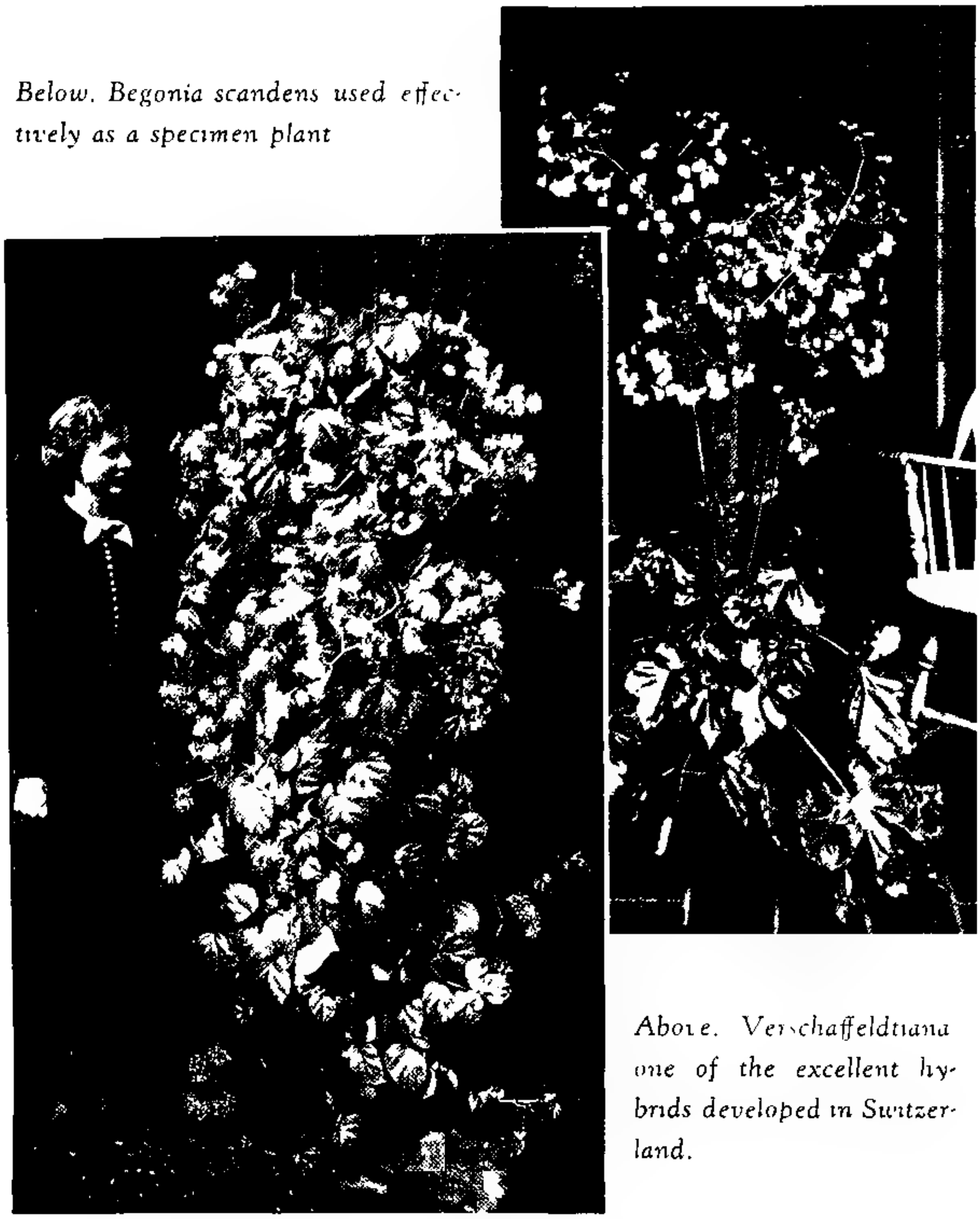
metallica — (Bahia) medium, bushy, hairy; leaves ovate-pointed, shallowly lobed and toothed, glossy olive-green; veins metallic-purple, depressed, red beneath; flowers pale pink, red-hairy without. A well-known plant of easy culture. (1869)

Mrs. Fred Scripps—tall, hairy, bushy; stems red; leaves ovate, distinctly 5- to 7-lobed with the basal lobe sometimes forming a separate leaflet, olive-green, often with one or more rudimentary leaflets from the sinus; inflorescences loose, many-flowered; flowers white. A handsome variety originated in California. (1934)

Mrs. Mary Peace—(***Ricinifolia*** x *B. caroliniaefolia*)? low, rhizomatous; leaves fleshy, pale green, deeply 7- to 9-lobed with the terminal lobe largest, glossy green, undulate, toothed; flowers numerous in erect, pyramidal cymes, pink. Raised in California. (1920)

Mrs. Townsend—In habit and leaf texture similar to ***Feastii*** but with leaves shallowly 7-lobed and toothed and inflorescences stiffer and more crowded and flowers slightly deeper in color.

Mrs. W. S. Kimball –medium, stiffly erect; leaves pointed-ovate, green with scattered bristly hairs; inflorescences short drooping cymes; flowers soft pink. Likes warmth. (1913)



Below. Begonia scandens used effectively as a specimen plant

Above. Verschaffeldtiana one of the excellent hybrids developed in Switzerland.

"***Multiflora Rosea***"—This is a pink-flowered *fuchsioides*. It is not related to the species *B. multiflora*.

Neely Geddis—tall, densely hairy; leaves ovate, dull olive-green, red beneath; flowers large, creamy white, white-hairy without, summer; like ***Prunifolia*** but with a rudimentary green leaf at the inflorescence fork. Raised in California.

Nelly Bly medium, bushy, hairy; leaves pointed-ovate, coarsely toothed, very dark green, red beneath; flowers pink. Originated in California.

nelumbufolia—(Mexico) medium, rhizomatous; leaves very large, ovate-orbicular, peltate, green; flowers small, many, in tall, erect cymes, white or tinged pink.

Neuchatel — (***Lucerna*** seedling) tall, smooth; shoots cane-like with weaker branches; leaves ovate with lobe near base, olive-green with faint silver spots; flowers dull dark pink tinged yellow. Not very attractive. Raised in California. (1934)

nitida — (Jamaica) medium, smooth; stems erect; leaves broad-ovate, fleshy, glossy green, convex; inflorescences many-

flowered; flowers large, white or delicate pink, handsome. This was probably the first species of Begonia introduced into cultivation. (1777)

olbia (Brazil) low, bushy; leaves ovate, lobed and toothed, thin, brownish olive-green with darker veins and scattered stiff white hairs, red beneath; inflorescences short, drooping; flowers greenish white. Not too easy but good when well-grown. (1883)

Orrell (***Lucerna*** seedling) medium, smooth; stems cane-like with weaker branches; leaves ovate, undulate, light green, silver-spotted; margins toothed and crinkled; flowers bright coral-red. Very decorative. Originated in California. (1920)

"Palmifolia" very similar to *dichotoma*, but having short style branches (which are practically absent in *dichotoma*) and the large ovary wing ovate and rounded at the apex rather than sharply triangular.

Paul Bruant — medium; stems erect, stout, bearing many tiny adventitious shoots as in *B. phyllomaniaca;* leaves pointed-ovate, 5-lobed, toothed, sparsely hairy, green; inflorescences with showy persistent pink-brown bracts; flowers bright pink; ovaries green. An excellent decorative plant. Raised in France. (1888)

Perle Lorraine (*B. polyantha* x *B. dædalea*) low, bushy; leaves pointed-ovate, dark green freely marbled with chocolate; flowers soft pink, darker in bud. A very beautiful variety. Raised in France. (1902) Listed as "Bertha von Lothringen."

phyllomaniaca—(Brazil) medium, stems and leaves freely producing adventitious plantlets; stem erect, stout; leaves ovate-pointed, glossy green, margins waved and toothed; inflorescence bracts small, early deciduous; flowers pink, ovaries pink. (1840) Listed as "Jessie."

Poggei—(Tropical Africa) low, stems erect; leaves ovate-acute, pinnately veined, dull green; inflorescences very short; flowers greenish; ovaries red, cylindrical, wingless. Young leaves said to be edible. A most curious species. Slow growing. Received from Kew 1937.

President Carnot (*B. coccinea* x *B. olbia*)? tall, vigorous; stems cane-like with weaker side-branches; leaves long-ovate, somewhat lobed, coarsely toothed and crinkled; green very faintly silver-spotted, reddish beneath; inflorescences large, drooping; flowers large, carmine; ovary and wings same color. French origin. (1891)

Preussen—almost identical with ***Bayern*** but silver spots evident only on the young leaves. Said to be of German origin.

Prunifolia—(***Viaude*** seedling) resembles ***Viaude***; leaves shorter and more distinctly egg-shaped, lighter green, more toothed, purple-red beneath; inflorescences long, drooping; flowers large, cream, white-hairy without. Very floriferous. Originated in California. (1920)

Rex-cultorum—Here belong the numerous beautiful foliage plants commonly grown as *B. Rex*. They include hybrids and mutants which differ considerably from *B. Rex*, which is probably not now in cultivation. ***Rex-cultorum*** is represented in the New York Botanical Garden collections by the following varieties: ***Chretien, Emperor, Glory of St. Albans, King Edward, Lucy Closson,*** and ***Rajah.***

See pages 64-65

BEGONIAS FROM THE BOTANICAL GARDEN'S COLLECTION

1. Begonia dichotoma, from Venezuela, nearly 6 feet tall. 2. Begonia luxurians, a similarly tall-growing species from Brazil. 3. Speculata, known as the "Grape Leaf" begonia. 4. Begonia glaucophylla, in a hanging basket. 5. Feastii, an easily grown hybrid known as the "Beefsteak" begonia. 6. Mrs. Fred Scripps, a large handsome variety originated in California. 7. Mrs. Townsend, similar to Feastii in its habit, but distinct. 8. Begonia imperialis, a rhizomatous species from Mexico. 9. "Machu Picchu," an undetermined begonia of exceptional beauty, raised from seed collected in Peru.

Ricinifolia —(*B. heracleifolia* x *B. peponifolia*) medium, rhizomatous, hairy; leaves large, rotund, lobed to one-third their diameter, bronzy green; inflorescences tall, erect, pyramidal; flowers numerous, pink. A small persistent appressed bract occurs at the base of each ovary. Probably the oldest hybrid. Raised in England. (1847)

Richardsiana — (South Africa) small, tuberous, bushy; similar to ***Macbethii***, but with leaves even more finely and deeply cut; flowers small, white. Listed as "Richardsoni."

Rosea-gigantea—(*B. semperflorens* x *B. Lynchiana*) medium, smooth; stems erect, succulent; leaves reniform, fleshy with a bright red spot at sinus; inflorescences stout; flowers many, bright coral-red, blooming over a long period. One of the most decorative and easily grown begonias. Much taller and more vigorous than *semperflorens*. A French hybrid. (1883)

Rossi—tall, smooth; stems erect, cane-like; leaves ovate, light green; margins red; inflorescences drooping; flowers large, pink. Decorative. (1920)

"Rubra Odorata"—a vigorous *coccinea* variety with deep rose-pink flowers.

Sachsen—very similar to ***Preussen*** but of looser habit and decidedly darker (bronzy olive-green) foliage. The female flowers of ***Sachsen*** are larger. Probably of German origin.

sanguinea—(Brazil) medium, smooth, loosely branched; stems red; leaves ovate, subpeltate, fleshy, green above, crimson beneath; flowers small, white. Distinctive and decorative. (1823)

scabrida — (Venezuela) tall, rough-hairy; stems erect, stout, branching; leaves broad-ovate, green, toothed; cymes erect; flowers many, small, white Received from Kew 1935.

scandens (Brazil) smooth, stems scandent, much branched, producing adventitious roots; leaves ovate to nearly orbicular, light green, glossy, shallowly toothed; flowers numerous, small, white. When given support forms a very attractive tall decorative plant or may be used to good effect in a basket.

Schmidtiana — (Brazil) low, hairy, bushy; leaves small, ovate, olive-green, toothed; flowers green, tinged pink, small, in few-flowered inflorescences. (1878)

semperflorens—Varieties of this species are popularly known as "Wax" begonias and are commonly grown from seed for summer bedding and for window gardens. Numerous varieties exist and new ones appear each year. The plants are low and bushy, bloom almost continuously and range in color of flower from white to deep crimson. Forms with red or purple foliage are grown. Among the distinct varieties grown at the Garden are ***Brightness***, ***Calla Lily***, ***Gustav Lind***, ***Indianerin*** and ***Loveliness.***

Shasta—a *coccinea* variety with greenish-white flowers and scattered small silver spots on the leaves. Originated in California. (1930)

Shrimp—a *coccinea* variety; leaves narrow, pointed; flowers soft pink. Originated in California. (1930)

Speculata — low, rhizomatous, hairy; leaves crowded, ovate, with 7 to 9 shallow lobes, coarsely toothed, rugose, leaden green with small green areas between veins; inflorescences erect, slightly exceeding leaves; flowers drooping, white, hairy without, the females subtended by conspicuous, persistent, green, red-edged bracts. The "Grape Leaf" begonia.

subvillosa — (Brazil) medium, softly glandular-hairy; stems succulent; leaves ovate, green, irregularly toothed; inflorescences drooping; flowers white, hairy without; ovary with only one prominent wing, the other two represented by mere ridges. Often grown as "Scotch luxurians." (1841) Raised from seed received from Edinburgh Botanic Garden.

Superba-azella—tall, vigorous, smooth; leaves narrow-ovate, irregularly and prominently lobed, bright green with red margins and paler veins. The only flowers observed at the Garden were borne on the inside of the large stipules. These were small and clear pink. Raised in California.

Superba-kenzii — resembles ***Superba-azella*** but with leaves less deeply and sharply lobed and sometimes sparsely spotted with silver. Has not bloomed at the Garden. Raised in California. (1925)

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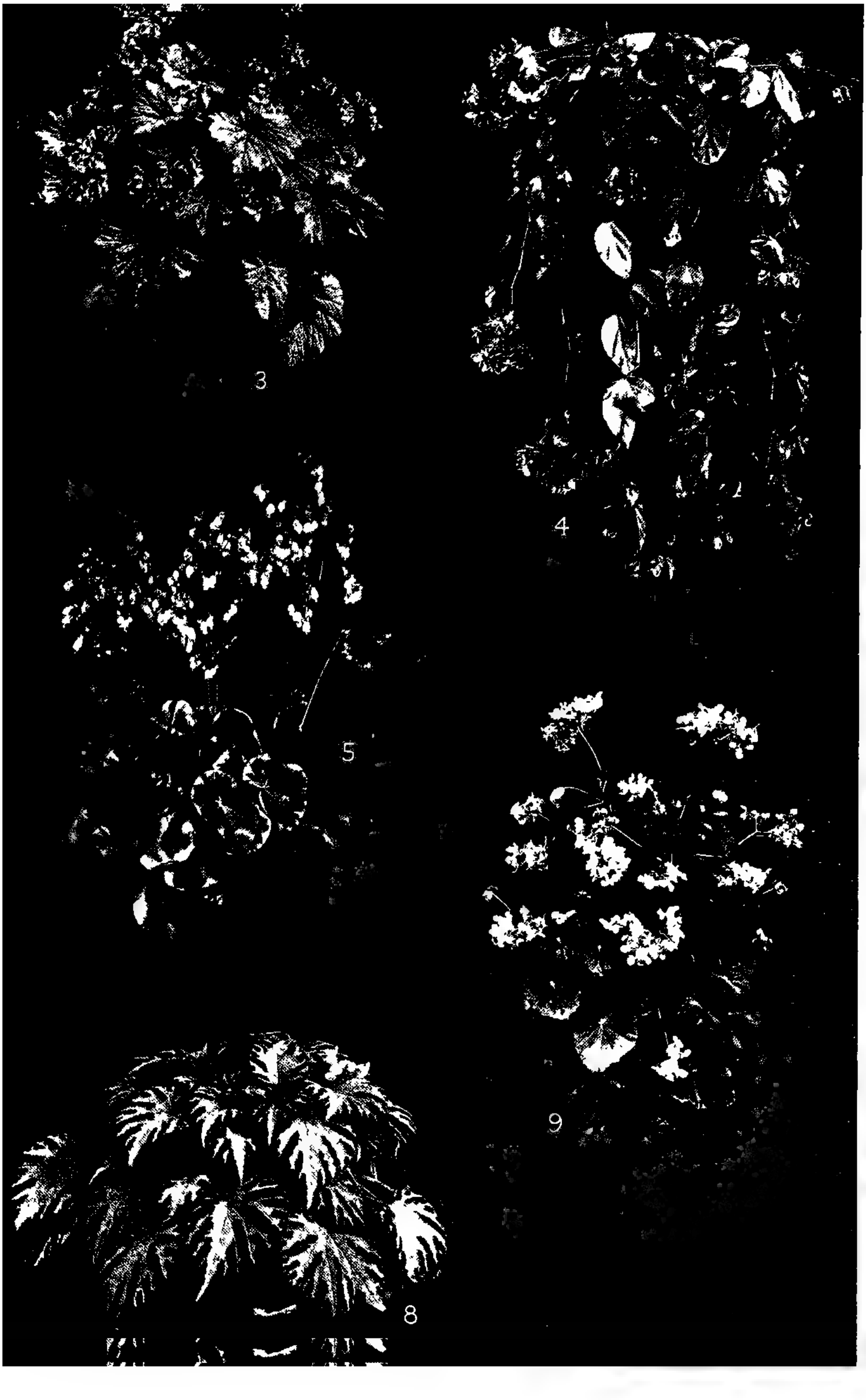
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Suretta—(***Lucerna*** seedling) medium, erect, bushy; leaves resembling those of ***Madame de Lesseps*** but smaller and more heavily spotted in silver; inflorescences short; flowers large, delicate pink to white. Originated in California. (1934)

Sutherlandii — (Natal) low, tuberous; leaves ovate-lanceolate, deeply lobed at base, bright green with red veins, serrate; flowers many, red-orange. Attractive and distinct. (1867)

Sylvia — (*incarnata* seedling) medium, loosely branched; leaves ovate, shallowly lobed and toothed, light green; flowers pink. Originated in California. (1900)

Templinii—(*phyllomaniaca* sport) similar to *B. phyllomaniaca* but with yellow-blotched leaves. Originated at Calla, Ohio. (1901)

Teuscheri — (Malaya) medium, pilose; stems erect; leaves ovate-acuminate, shallowly lobed, toothed, olive-green; margins red; flowers deep pink. Plants received from Kew in 1937. (1877)

Thurstonii—(*B. metallica* x *B. sanguinea*) tall, bushy; leaves ovate, glossy olive-green, red beneath; flowers small, pink, summer. An easily grown and popular variety. Originated in Paterson, New Jersey. (1887)

ulmifolia — (Colombia) tall, rough-hairy; stems erect, brown-scurfy, grooved; leaves pinnately veined, elm-like, green; inflorescences dense; flowers small, white. Very distinctive.

Undine—low, branched; leaves small, of curled and distorted appearance, broad-ovate, fleshy, glossy green, irregularly-toothed; flowers delicate pink, in few-flowered cymes. Originated in California. (1900)

undulata—(Brazil) medium, similar to ***Keewensis*** but with smaller leaves which are distinctly undulate, and pure white flowers. A very decorative species. (1827)

venosa -(Brazil) medium; whole plant covered with dense white scurf; stems erect, thick, hidden by the very large membranous stipules; leaves reniform, depressed at center, not peltate, very thick and fleshy; inflorescences long; flowers white. Our plants raised from seed from Berlin-Dahlem 1933. (1898)

Verschaffeldtiana—(*B. caroliniaefolia* x *B. manicata*) medium; stems stout, erect; leaves fleshy, long-petiolate, ovate-orbicular, shallowly 6-lobed, irregularly toothed, rich shining green; inflorescences long, many-flowered; flowers drooping, clear pink. Very handsome. (1853) Originated in Switzerland.

Viaude — (***Duchartrei*** x ***Pictavensis***) medium, hairy; leaves ovate, olive-green, shallowly toothed; stipules persistent; peduncles long, red; flowers large, white, hairy without. Decorative. Raised in France.

Wadei—(Philippines) low; stems stiff, erect; leaves on upper part of stem only, fleshy, oblong-ovate, convex, green; flowers few, laxly arranged, pink. First described by Dr. E. D. Merrill of The New York Botanical Garden in 1932. Grows naturally on coralline limestone near the sea. (1932)

Waite's Red Argentea—tall, very similar to ***Lucerna*** but with leaves lighter green, more silver-spotted, more distinctly red-margined and more distinctly lobed; flowers deep pink, large, in pendulous clusters. Originated in California. (1927)

Wallow—medium bushy, bristly-hairy; leaves ovate-lanceolate, olive-green, bright red beneath, coarsely toothed. Has not flowered at The New York Botanical Garden. Originated in California. (1928)

Washington Street tall, freely branched; stems semi-succulent; leaves ovate-acute, glossy green, serrate; inflorescences short, many; flowers white. Found as a chance seedling in a California garden. The "Peach-Leaved" begonia.

Weltoniensis—(*B. Sutherlandii* x *B. Dregei*) tuberous, medium, bushy, smooth; base of the branches much swollen; leaves ovate-acuminate, shallowly lobed and toothed, pale green with purplish veins; flowers pink, profuse. Raised in England. (1870)

Weltoniensis Alba - a white-flowered form.

xanthina — (India) low, rhizomatous, allied to *B. Rex*; leaves cordate-ovate, dark green; flowers butter-yellow, petals copper-red beneath. (1850)

In addition to the species, varieties, and forms described above, the begonias listed below are grown at the Garden. Descriptions are not given either because these plants are not at this time suitable for exhibition or because of uncertainty as to the correct applications of the names they bear. A number of unnamed plants are also grown. The tuberhybrida varieties are not listed.

ALBO-PICTA
ALICE MANNING
ALPHONSE
ALZASCO
AUDREE
BENNETT RUBRA
BOLIVIENSIS SUPERBA
CARMINATA
CASTANEAEFOLIA
CHIALA ROSEA
CLEMENTA
CLIBRAN'S RED
CONCHAEFOLIA
CORINTHIAN PINK
CORAL RUBRA
CRISTATA
CROFTONII
CYPRAEA SEEDLING
DECORA
DUCHARTREI
DUKE OF CAMBRIDGE
ECUADORENSIS
ELITHE
EMILY CLIBRAN
ETHEL CALLOWAY
EVANSIANA ALBA
FLAMBEAU
FROEBELII
FRUTICOSA
FRUTICOSA SEEDLING
FRUTISCARIA
GENEVA
GIGANTEA
GLABRA
GLOIRE DE LORRAINE
GLORY OF CINCINNATI
GRACE
GRACILIS HETEROSIS
GRANT'S DUCHARTREI
GUINEA'S WING
HAAGANA
HAAGEANA DROSTII
HAWAIIAN SEEDLING
HOUGHTONII
HUGELII
ILLUSTRATA
INCARNATA SANDERSII
JOSEPHII
LADY MAC
LADY WATERLOW
LEPIDOTA
LETONICA
LINDLEYANA
LOBATA VARIEGATA
LOMA ALTA
MACBETHII PINK
MARGARET E. HARM
MARIETTA
MARION
MARTHA
MARTIANA
MAYBELLE E.
MEDIA PICTA
MEGAPTERA
MELIOR
MORGANO
MRS. M. E. HAM
MRS. SCHINKEL
MULTANGULA
MULTIFLORA "COPPERY GOLD"
NITIDA ODORATA
NITIDA ODORATA ROSEA
PAPA CHEVALIER
PARVIFLORA
PEACH GLOW
PEARLI
PERFECTIFLORA
PERLE DE GARD
PICTA
PICTA ROSEA
PICTAVENSIS
PINK CANE
PLAGIONEURA
PRUNIFOLIA PINK
RED COMPTA
RICINIFOLIA FISHERI
RIGIDA
ROBEGO
ROBINSON'S FRUTICOSA
ROBUSTA
ROBUSTA DECKERS
ROXBURGHII
RUBEGO
RUBELLA
RUBRA ODORATA
RUBRA PINK
RUBRO-VENIA
SCEPTRUM
SCHARFFIANA
SEA SHELL
SILVER FLEECE
SOCOTRANA
TEWKSBURY RED
VAN-EX
VEDDERI
VENUSTA
VITIFOLIA
WALLICHIANA
WETTSTEINII
WHITE CANE
YOSEMITE
ZELMA
ZURICH

Composing a Border Of Annuals

By Howard W. Swift

PLANTS which may be grown from seed to maturity in one season have advantages possessed by few other types of garden material listed in the elaborate seed catalogs of 1930.

For use in window boxes, for rented properties, for newly developed suburban homes, for children's gardens, and for situations where masses of color are desired during a particular part of the summer or autumn, no group of plants will bring more satisfaction than annuals, carefully chosen and properly grown; and no plants will produce a greater wealth of flowers at such moderate expense.

A few requisites must be taken into consideration before actual composition of an annual border is undertaken. In the first place, annuals need full sun. Secondly, preparation of the ground should be thorough, the ideal practice including cultivation to a depth of eighteen inches and incorporation of liberal quantities of manure. As a substitute for the manure, peat-moss and a complete commercial fertilizer may be used—peat for its ability to retain water and nutrients, fertilizer to supply essential elements of plant food. Thirdly a proper background should be provided. Without it, maximum satisfaction will not be achieved. In some cases, a wall may make a perfectly good background, but a more pleasing effect is usually produced if it is neutralized by the use of vines. Evergreen or deciduous shrubs furnish excellent backgrounds, and in situations where a temporary planting is desired, annual vines may be effectively trained upon a well proportioned and well constructed trellis.

Several factors govern the choice of annuals for border planting. Length of blooming period, ease of culture, and resistance to the attacks of insects and diseases are important, but not to be overlooked is the sturdiness which enables the plants to withstand the roughness of strong winds and heavy rains.

With consideration for the above factors, the following annuals, grouped according to their height, are particularly recommended:

Four to Six Feet High

Cosmos
Ipomoea (Morning Glory)
Quamoclit (Cardinal Climber)
Helianthus (Sunflower)
Polygonum orientale (Prince's Feather)
Hibiscus Manihot

Two to Four Feet High

Tagetes (Marigold)
**Scabiosa*
Zinnia
Salvia farinacea (Mealy-cup Sage)
S. splendens (Scarlet Sage)
**Amaranthus caudatus* (Love-lies-bleeding)
**A. gangeticus tricolor* (Joseph's Coat)
**Nicotiana alata*
**N. sylvestris*
**N. Sanderae* (Crimson King)
**Euphorbia marginata* (Snow-on-the-mountain)

One to Two Feet High

**Ageratum Houstonianum*
**Verbena rigida*[1]
**Petunia hybrida*
**Vinca rosea*
**Mirabilis Jalapa* (Four o'clock)
**Celosia plumosa* (Feathery Cockscomb)
**Centaurea Cyanus* (Bachelor's Button)
**C. moschata* (Sweet Sultan)
**Hunnemannia fumariaefolia* (Santa Barbara or Tulip Poppy)

Six to Twelve Inches High

**Ageratum Houstonianum* "Fraseri"[2]
**Verbena hybrida*
**Lobularia maritima* (Sweet Alyssum)
**Lobelia Erinus*
**Eschscholtzia californica* (California Poppy)
**Torenia Fournieri*

With a selection of annuals which promise to be most dependable, a plan drawn to scale will help greatly in placing them effectively. In composition of detail, logic dictates starting at the back of the border and progressing toward the front, and cosmos furnishes excellent material with which to start. Groups of six or eight plants (later to be thinned to three or four), each group representing a single color, are ideal for the back. To these may be added groups of the smaller sunflowers such as the Stella hybrids, and groups of hibiscus which will supply brightness in late summer. Polygonum is fine for its foliage effect and feathery pink flowers but, because of its massiveness, it must be used with care. As polygonum frequently grows to eight feet, it is unsuitable for a narrow space.

Climbing plants may be included in the border itself, not necessarily used as a background only, by letting them clamber over tepees made of twiggy branches. For this purpose beech or birch is cut the preceding winter into five- or six-foot lengths to be thrust into the ground to form an inverted cone, or tepee, as support for vines like the cardinal climber and morning glory. Used in this way, these climbers add distinct character to a garden of annuals.

Color arrangement offers the first problem in developing a planting scheme from groups of larger plants. It is well to remember that when each color is used in a group of comprehensible size, the effect will be most striking. The newer marigolds and zinnias are superb for this purpose, but the Japanese beetles share our regard and relish them for feeding. These plants, in their gorgeous colors, have no substitutes, unfortunately, so there is little to do but use them and keep the onrush of beetles at a

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* Annuals not attacked seriously by Japanese beetles
[1] Common known as *Verbena venosa*
[2] Strictly a trade name.

minimum. With both of these flowers, individual colors rather than mixtures will be found most effective, and much depends upon a careful selection of varieties.

For light, airy effect to break up masses of coarser material, *Scabiosa*, in its numerous tones of pink, purple, and blue, *Euphorbia marginata* in green and white, and *Salvia farinacea* with its soft blue spikes all possess merit, and will bloom from early summer until frost.

Salvia splendens, vividly scarlet, and *Amaranthus caudatus,* red of a different nature, each has its admirers, but in using them neighboring plants must be considered with care as their colors are difficult to combine with others.

With *Nicotiana alata* and *N. sylvestris*, favorites with all who like the sweet fragrance of their white trumpets at night, a second or even third period of bloom may be enjoyed if the stems are cut back after the first flowering. A red form, *N. Sanderae* "Crimson King" is another excellent representative of this genus.

Groups of plants of intermediate height may be brought to within a foot or two of the front of the border—or all the way forward here and there—so that the heights of plants will not become monotonous. The soft blue coloring of *Ageratum* is beautiful with the yellow of sun-drenched *Hunnemannia*, the stiff triteness of pink zinnias or the velvety depth of purple petunias. Here too may be used those two plants which are so exceptional in sturdiness, in flower production, and in ease of culture—*Verbena rigida* and *Vinca rosea alba*. The purplish hue of this verbena may seem difficult, but if is well used with several of the marigold varieties. *Centaurea Cyanus*, *Centaurea moschata* and *Mirabilis Jalapa* were favorites of our grandmothers and are no less favorites today. *Celosia plumosa* too is an old standby which many find worth growing for its interesting plumes of straw-colored or deep red flowers.

For the front of the border, there is a choice between making one solid edging, or continuing the group effect all the way forward. In the development of a short border, the continuous edging is attractive, but in extensive borders, groups of plants varying in height and character intensify the effect of an entire composition.

Plants suitable for the front of the border include *Ageratum* in low forms; *Verbena hybrida,* in a variety of desirable colors; sweet alyssum, California poppy, and the two-toned blue and purple flowers of *Torenia Fournieri.* All of these blend easily with groups of larger plants and, with the exception of the California poppy, will bloom throughout the summer.

With the border planned on paper, the next problem is the acquiring of plants. Annuals are of simple culture and, when seeds are procured from a reliable firm, even the amateur should be well rewarded for his efforts in making an annual border. Among the plants listed here, the Polygonum, Scabiosa, Euphorbia, Nicotiana, and Eschscholtzia may be sown directly in the ground, whereas the others are more successfully started indoors and set out from flats after danger of frost is past. In the vicinity of New York, late March is the usual time for sowing seeds of these plants indoors.

One of the greatest advantages of an annual border is its challenge to the imagination. Color schemes which alter the entire character of a border may be changed each year and, by using the plants listed above as a foundation for new introductions and novelties, the possibilities for composition of successful annual borders is practically without limit.

Spring Lectures at the Garden

BELOW is the program for the spring series of free lectures to be given in the lecture hall in the Museum Building every Saturday through May at 3 p. m.

Mar. 4 ***Preparing Flower Show Exhibits***
George Gillies, Supt., Marshall Field Estate

Mar. 11 ***Timberline Trails to the Yukon***
W. H. Camp, Assistant Curator

Mar. 18 ***Composing a Border of Annuals***
Howard W. Swift, Gardener

Mar. 25 ***Raising Flowers For Cutting***
Mrs. Jerome W. Coombs, Author and Lecturer

Apr. 1 ***Gardens of Today and Tomorrow***
E. L. D. Seymour, Horticultural Editor, American Home

Apr. 8 ***Trees for City Gardens***
Nelson M. Wells, President, City Gardens Club

Apr. 15 ***Our National Parks***
H. N. Moldenke, Associate Curator

Apr. 22 ***English Parks and Gardens***
T. H. Everett, Horticulturist

Apr. 29 ***Plant Exploring in British Guiana***
A. C. Smith, Associate Curator

May 6 ***Some Seaweeds and Their Companions***
H. Beaman Douglass, M D (Retired)

May 13 ***Springtime Flowers About New York***
E. J. Alexander, Assistant Curator

May 20 ***Raising Healthy Plants Outdoors***
B. O. Dodge, Plant Pathologist

May 27 ***Rose-Growing For the Beginner***
P. J. McKenna, Foreman Gardener

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Plant Explorer's Autobiography

THE WORLD WAS MY GARDEN. David Fairchild. 494 pages, indexed, illustrated. Scribner, New York, 1938. $3.75.

Delightful recreational reading for the botanist as well as the layman interested in economic plants is provided by this truly charming combination of autobiography and story of plant exploration. Dr. Fairchild probably more than anyone else has been responsible for introducing into our country a great number of exotic food plants, and in this volume he relates in fascinating simplicity the romance of travel and exploration involved in his search and the search of others for them. To enumerate the many kinds or to repeat the comments concerning them is beyond the scope of any review, but a few other important matters merit notice here.

From a family of intellectual pioneers, which numbered one college founder and three college presidents, David Fairchild emerged upon the scene of science in the very infancy of American scientific agriculture. During the course of his life's work, the fruits of which he still enjoys, agriculture in America has waxed into a mammoth enterprise, epitomized by the highly developed United States Department of Agriculture. Fairchild became associated with this body in 1889, the same year in which it gained a seat in the President's Cabinet. He had been graduated only the year before from the Kansas State College of Agriculture, and during the next four years was engaged primarily in pathological work In 1893, against much advice, he resigned and went abroad to study. It was during this voyage that there occurred in Fairchild's life one of those fortuitous incidents which so often determine men's lives. It involved his first view of a pair of pajamas—nightshirts were still the rage and in the pajamas was one who was later to become Fairchild's benefactor during many years and a life-long friend. It was Mr. Barbour Lathrop of the Bank of Scotland in London and it was his desire to "invest" part of his wealth in some scientific enterprise which resulted in a whirlwind of world-wide travel for himself and Fairchild in search of valuable economic plants which might be introduced into America.

The greater part of the book with its interesting botanical observations and many incidents of human affairs, is concerned with the many years devoted to this work. The details are what make the book worth reading and through it all is the charm of human relationships and characters, for Fairchild knew, among countless others, Ferdinand Cohn and the great Brefeld, as well as certain of our contemporaries, such as W. T. Swingle and R. A. Harper, whom we of the younger generation are also privileged to know

E. H. FULLING,
Editor, The Botanical Review.

Plant Physiology, Enlarged

PLANT PHYSIOLOGY. E. C. Miller. 2nd edition. 1,201 pages, 39 figures, author and subject index. McGraw-Hill, New York and London, 1938. $7.50.

The new edition of this valuable reference book is an enlargement of the first edition; some 300 pages have been added. The chapter headings include the plant cell, solutions and membranes, the roots of plants, intake of water, intake of solutes, elements absorbed by plants, loss of water, formation of carbohydrates, nitrogen metabolism, fat metabolism, digestion, translocation, respiration, and growth. It is rather surprising to find no chapter on reproduction, in fact that word is not even contained in the index. The book is neither planned for nor

adapted to the amateur or the beginning student; its special value is for the investigator and the advanced student. One of the fine features is the extensive bibliography which accompanies each chapter; for example, more than 450 references to the original literature are cited with the chapter on the plant cell. American literature, including publications from the Agricultural Experiment Stations is particularly well represented. Botanists, especially those interested in plant physiology and its applications, owe Dr. Miller a debt of gratitude for the compilation of this monumental volume.

As might be anticipated, various criticisms may be made of such a text. It is unfortunate that the author found it necessary to limit the book to higher plants, as much which elucidates processes in the higher plants has been found in a study of the lower forms. Furthermore, the presentation is largely uncritical; in fact, the author states that he has tried to present the data impartially; nevertheless, more digestion and critical analysis would make the book easier reading and less like a collection of abstracts. The author and subject indices are extensive yet there are curious omissions from the latter, for example—toxicity, distilled water, plant movement, irritability, reproduction, and ash are not listed in the subject index. In examining a book of this type one cannot but gain the impression that a complete plant physiology of advanced character is probably beyond the power of any single individual.

W. J. Robbins.

Artistic Tropical Blooms

FLOWERS OF HAWAII. Olive Gale McLean and Mary D. Frear. 30 plates of flowers with stories. Dodd, Mead and Company, New York, 1938. $5.

Though not to be considered a significant addition to the literature on Hawaiian botany, this book is eminent as an artistic contribution to *Hawaiiana*. It will be welcomed both as a series of superb flower plates and as a piece of the finest of modern book manufacturing.

Olive Gale McLean has painted thirty of the most striking of the exotic ornamentals of Honolulu in a manner both artistic and realistic, paradoxical as that may be. These have been reproduced unusually well, the only fault being, perhaps, a slight over-vividness of some of the greens.

Fortunately the plates are well able to speak for themselves, as the text portrays the author's emotions rather than much additional information about the plants. The foreword explains the conspicuous absence from the book of any real, indigenous "flowers of Hawaii" and brings out the unfortunate fact that the visitor to the islands is likely to see only these immigrant members of the flora. As a matter of fact, the pictures could be equally well labeled flowers of Havana, or of Rio, or of Singapore, or any other tropical place. The country of origin and common and scientific names are given for each plant. For a book of this nature, the scientific names are remarkably accurate. Several corrections might be suggested: *Languas* should be used in place of *Alpinia* (Plates 8 and 12), *Plumeria* rather than *Plumieria* (Plates 5 and 9), *Cereus undatus* for *C. triangularis* (Plate 28), and *Cassia javanica* instead of *C. nodosa* (Plate 7). *Delonix regia* is made to do double duty, in the text correctly applied to the royal poinciana (Plate 18), and in the foreword to the royal palm, which is *Roystonea regia.*

For the visitor with merely a casual interest the book may serve as a useful guide, though a very expensive one, to a few of the most conspicuous and beautiful plants to be seen in Honolulu. For the lover of fine flower plates or of handsomely made books it will be a treat. For the stay-at-home the plates will afford a glimpse of the rich flora of warm countries, and for the wanderer a touch of homesickness for the tropics. For the person interested in the flora of the Hawaiian Islands, the book has little to offer.

F. R. Fosberg,
University of Pennsylvania.

New Facts Revealed About Poisonous Plants

POISONOUS PLANTS OF THE UNITED STATES. Walter Conrad Muenscher. 266 pages, illustrated, indexed. Macmillan, New York, 1939. $3.50.

Since earliest times people have been interested in poisonous plants, and in more recent years, with advances in chem-

ical analyses of plants and their constituents, more of the toxic elements have been discovered and isolated. These analyses have revealed some startling facts about poisonous plants, namely that some thought to be extremely poisonous are in reality not so severely so, while others heretofore unnoticed have decidedly toxic properties. Another revelation of recent investigations is that the toxicity in a given species varies from time to time. The author in his preface points out some of these interesting and varying judgments. He has brought together "the more salient contributions from all the research in this country and elsewhere concerning the poisonous plants which occur in the United States."

The book is arranged in two parts. Part I deals with the nature and classification of poisonous plants. Part II describes in detail the poisonous plants arranged botanically according to families. There is a complete index, and the literary references are comprehensive. The numerous illustrations will assist the reader in recognizing the plants described, and they further emphasize in general the particular portion of the plant in which the toxic substances may be located.

The author has brought up to date an important subject. He has listed and described the species of plants which are most poisonous to animals and man. The work will be found timely and useful, in addition to being interesting and readable.

JESSIE G. FISKE,
New Jersey Agricultural Experiment Station.

Autobiographical History

SIXTY YEARS OF BOTANY IN BRITAIN (1875-1935). Impressions of an Eye-witness. F. O. Bower. xi+112 pages, with frontispiece and 13 other illustrations. Macmillan, New York and London, 1938. $3.75.

With the growing complexity of the plant sciences, it is becoming increasingly difficult for one man to write a satisfactory history of botany. But when one selects a particular phase of that history, and writes from a wide personal experience, he is on safe ground. And that is precisely what has happened in the case of this small volume. The author was in a position to say, with Ulysses, "I am a part of all that I have met."

Bower has realized that he is the last survivor of those who participated in the introduction into England of the laboratory methods of botanical study that have come to be taken for granted; and he has placed his colleagues under obligation by this charming tale of his experiences. In spite of its title, implying a history, this is essentially an autobiography, correlated throughout with contemporary developments in the author's chosen field, and illustrated with pen-sketches and portraits of his fellow-workers.

Besides outlining his own career, from his first lecture at South Kensington to his retirement from the professorship of botany at Glasgow, and outlining the advances in fossil botany, in plant physiology, and in plant morphology, Bower presents in some detail the events leading to the establishment of the *Annals of Botany*. This journal has from the first maintained its pre-eminence among those in the English language devoted wholly to the science of plants, and celebrated about two years ago the completion of its fiftieth year and volume. It is of particular concern to the botanists of the United States that one of the editors of the Annals has always been an American.

Among the biographical sketches a particularly noteworthy one is that of Thiselton-Dyer. He is remembered by most of those who knew him as an unassuming gentleman of no remarkable botanical attainments, who devoted twenty years to his routine duties as director of the world's greatest botanical garden; and even that distinction is often supposed to have come to him as son-in-law of his predecessor, Sir Joseph Hooker. Bower, however, who knew him before he married Harriet Hooker, and even before he first entered the service of Kew, rates him high as a botanist. He emphasizes the fact that Dyer was the first teacher in England to give a laboratory course in botany. Attention has been called to this before, but in a less conspicuous manner. At the time of Dyer's death one of his biographers stated that "Dyer's course was the starting point of a new movement in botany," and the same writer remarked his deep interest in the work of the Jodrell Laboratory at Kew.

This book of less than 125 pages is a model of accuracy, conciseness, and read-

ability, and is a good example of the author's mastery of the English language. It may be commended to the attention of all botanists.

JOHN HENDLEY BARNHART.

A Pharmaceutical Botany

TEXTBOOK OF PHARMACEUTICAL BOTANY. 6th edition. Heber W. Youngken. 740 pages, index, drawings, half-tones, frontispiece. Blakiston, Philadelphia, 1938. $4.75.

The sixth edition of this well known book departs from previous editions in that the text material provides a cultural background with the necessary fundamentals for the future work of the student in the study of pharmacognosy. The plates have been increased with an excellent choice of figures for illustration.

Work in the food and drug industries demands a very thorough discussion of cells and cell inclusions. Such material is not sufficiently covered in the average college-grade text. A wealth of illustrative material is provided that could well be introduced in those courses of botany that stress the economic value of plants. The combination of cultural and professional objectives is well developed. Professor Alexander Tschirch, who appears on the frontispiece, while little known in this country, pioneered many studies that led to the enactment of the pure food and drug laws in the United States.

WILLIAM J. BONISTEEL,
Fordham University.

For Hybridizers

PRACTICAL PLANT BREEDING. W. J. C. Lawrence. 155 pages, illustrated, indexed. George Allen & Unwin, Ltd. London, 1937. 5/6. Distributed in America by A. T. De La Mare, New York. $2.

This handy little volume aims "to outline in simple terms" the scientific background of plant breeding "for the practical man" and for "the amateur gardener and nurseryman, or for the student who is beginning to specialize." There are chapters on (1) The Structure of Flowers, (2) Pollination and Fertilization, (3) The Technique of Breeding, (4) The Laws of Inheritance, (5) The Mechanism of Inheritance, (6) Sterility, (7) Methods of Plant Improvement, and (8) Results of Plant Improvement.

A. B. STOUT.

Current Literature At a Glance*

By Virgene Kavanagh

Saxiflora. The first eight descriptions of rock garden plants to be published by the American Rock Garden Society have appeared in loose-leaf form under the name *Saxiflora.* A full-page drawing showing the flowers and leaves and the habit of the plant accompanies each description, which is intended "to present a careful study of an individual kind of plant with particular attention to identification, nomenclature, and culture." Members of the committee in charge of publication are T. H. Everett, chairman, E. J. Alexander, Carl English, James G. Esson, Montague Free, and P. J. van Melle. The plants described in this initial number are *Daboccia cantabrica, Chrysogonum virginianum, Epimedium macranthum, Alyssum scardicum, Saxifraga cortusaefolia, Daphne Genkwa, Primula vulgaris,* and *Scilla sinensis.*

Plant Cartoons. Colored plates of flower paintings interspersed with cartoons illustrating friendships and enmities among different kinds of plants, are contained in "Jahrbuch Madaus, 1938," an attractive trade publication from Radebeul-Dresden, Germany. The illustrations are taken chiefly from Volume I of the company's "Lehrbuch der biologischen Heilmittel."

Collectors. Monkeys can be trained to collect plants for botanists as well as coconuts for natives. Two monkeys are in use at one of the Indian botanical stations. They seem to enjoy the collecting and frequently drop unusual flowers or twigs not visible from the ground in addition to those they are directed to pick.
Journal of Botany, January 1939.

Giant Forests. The redwood forests of California have been photographed in color for the *National Geographic Magazine,* February 1939, to illustrate an article by J. R. Hildebrand.

West Africa. "The Useful Plants of West Tropical Africa," an appendix to the "Flora of West Tropical Africa" by J. M. Dalziel, records the common and

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

vernacular names, commercial uses, medicinal uses among the natives, and other interesting information about the plants described in the Flora. It is published by the Crown Agents for the Colonies, 4, Millbank, Westminster, London.

Old Herbals. Mrs. Rosetta E. Clarkson, editor of the *Herb Journal,* is attempting to locate old herbals and similar books in existence in private hands today. Her request is to send to the *Herb Journal,* 412 Gulf Street, Milford, Conn., title, author, edition, publisher, date and place published, whether illustrated, and whether original or reprint, if you own or know someone who owns an old herbal (dated before 1700) or an old gardening book (before 1700) or an old-time still-room book (before 1800).

Notes, News, and Comment

Colloquium. Dr. William J. Robbins spoke at the zoology colloquium at Columbia University January 31 on "Growth Substances for Plants."

Lectures. The Horticultural Society of New York presented a lecture by Dr. William J. Robbins on February 15, entitled "The Background of Horticulture." Dr. Robbins was elected a Director of the Society on January 11.

The Little Gardens Club of Greenwich Village heard an illustrated lecture at its Garden Center at New York University on January 9 by P. J. McKenna, who spoke on "Around the Year at The New York Botanical Garden." Among other lectures recently given by staff members are "South African Plants" by T. H. Everett before the South Orange Garden Club, an affiliate of the Botanical Garden, February 13, and "Exploring for Plants in British Guiana" by Dr. A. C. Smith before the Torrey Botanical Club, February 7.

Conference. Dr. Gladys E. Baker of Hunter College gave an illustrated address on "The Lichens Collected by the Byrd Antarctic Expedition" at the monthly conference of the staff and registered students on February 10. Following her talk, Dr. F. J. Seaver spoke on "Botanizing in Bermuda."

Competition. The City Gardens Club, 598 Madison Ave., announces a competition in design of a garden for Greenwich House Music School, 46 Barrow St., N. Y. C. The contest closes at noon March 30.

Some Forthcoming Horticultural Features of this Journal in 1939:

More on Begonias

Roses—Practical Information by a Group of Experts

A New Method of Propagating Rhododendrons

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

April, 1939

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FOR NATURE STUDENTS

When a famous actor of about two decades back spoke his alliterative lines about "the little buds bu'sting on the bushes," he was expressing the sentimentality which seizes nearly every person in the spring, when balmy air and flowing sap bring plant life into evidence again.

At the Botanical Garden the revival of interest in growing things is seen each year in the numbers of people who write, telephone, or call to ask, "What is this plant that I found in the woods yesterday?"

This casual, seasonal interest not infrequently translates itself into an intelligent demand for a greater knowledge of plants. The week-end collections of amateurs, the studies which they pursue evenings and in other odd hours of spare time, often result in genuine contributions to the science of botany. Sometimes an unfamiliar plant brought in by chance from the seashore, fields, or woods will prove to be a new species for the region, a new form, or the extension of the range of a plant. At other times the contribution of an amateur is the result of definite and serious study.

Many people around New York—and some who are far away—have learned to use The New York Botanical Garden to assist them with their identifications and other studies of plants. In the library they find illustrated books on ferns, mushrooms, mosses, trees, shrubs, herbaceous plants of the wild, and other forms of plant life, such as the lichens, algae, liverworts, and myxomycetes, all of which have their devotees among nature students. There are also volumes on other phases of botany—plant physiology, genetics, pathology, and such. Some of the publications issued by the Botanical Garden are of definite help to the beginner, as well as to the long-experienced or professional botanist.

On the main floor in the Museum Building there is a collection of more than 700 different kinds of flowering plants and ferns which are characteristic of the region within 100 miles of New York City. Staff members will locate further examples in the herbarium when a plant brought in for identification merits special attention. In fact, The New York Botanical Garden wants to encourage persons who are making the study of plant life their avocation. The knowledge of the staff and the institution's facilities are at the service of the botanically minded public.

JOURNAL
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The Japanese Art Of Arranging Flowers For the Home

By Ervin S. Ferry

Master of the Ikenobo, the Misho, the Saga, and the Senkei Schools of Japanese Flower Arrangement

PLANTS and flowers in Japan are held in such high esteem that they have been given souls and patron gods and goddesses. Thus they play an important part in the life of the people. A Japanese home may contain very little furniture, but there will nearly always be a flower composition in the alcove of the principal room. Though done in apparently simple style it will be the dominant feature.

The Japanese have a fine feeling for the decorative value of plants, and they believe that beautiful flowers and branches of interesting shape, introduced into the home, are worthy of thoughtful consideration. Such plant materials take on the importance of guests in the house and, like other guests, appear to best advantage when selected so as to be in harmony with each other and with their surroundings. Flowers that naturally grow in the same environment agree better with one another than flowers that thrive in quite different situations. A mountain flower would be as much out of place in a group of water-loving plants as would a Bedouin in a group of debutantes.

In Japan, the systematic study of the flower art is more common than the study of music in America or Europe. Most women and many men take lessons regularly and practise conscientiously for a time long enough to become proficient in designing compositions for home decoration.

For pictures, statuary, and flower arrangements alike, there are two great types of composition—mass and line. Many occidental paintings are primarily compositions of massed color, light and shade. Etchings, on the other hand, depend for their appeal upon beauty of line. In most of the flower compositions of America and Europe, the arrangement of color masses receives the chief attention, whereas the consideration of line is

A composition in the Nageire style suggesting abundance, according to the Saga school.

neglected. In fact, in many of them, only flowers and foliage are visible. Japanese painters and flower masters, on the other hand, emphasize lines for their beauty. In all of their compositions, branches, stems and flower stalks are given primary consideration.

Another important difference between an occidental and a Japanese flower composition is that the former is frankly a group of plant materials separated from their roots and thrust into a vase, whereas the latter is made to simulate a living plant or group of plants. The cut ends of all plant material in a Japanese flower arrangement are hidden below a broad water surface representing the earth. Transparent vases are not used. All flowers, buds and branch tips are directed upward as they were while growing.

Some charming works of art are designed for no purpose other than for decoration. Others not only satisfy the esthetic judgment but also evoke

The buoyant joy of strength, virility, and dynamic beauty is expressed in the rhythm, dissymetry of balance, and the unity and harmony of lines, masses and space of this Kakka composition according to the Senkei school.

in the mind of the beholder some sentiment, emotion or idea. Many Japanese flower compositions are of this latter class. To an instructed viewer, one flower composition may express welcome to a friend returning from a long voyage. Another may express "God speed," congratulations, condolence, hopes for various blessings, or it may suggest a familiar tradition, poem or precept. For example, a composition consisting of a toy hatchet beside an arrangement of flowering cherry tree branches, exhibited on February 22, would suggest to any American a familiar story, which would render this composition suitable as a symbol of truthfulness.

There are many systems or "schools" of principles, methods and technique that are accepted and practised by large bodies of adherents. The oldest and largest of these Japanese schools is the Ikenobo which dates back to the seventh century and is still so highly esteemed and popular that it has today more than one and one-half millions of living students and ex-students. The Saga-onryu is another outstanding school more than one thousand years old.

Throughout all of these centuries, men endowed with love of Nature, esthetic sensibility and poetic imaginations have observed, studied and wrought till now we have a great body of experience that is available in clearly stated principles and numerous suggestions. These are not mandatory but, if followed, will result in faultless compositions. Anyone who loves flowers and wishes to treat them with respect and consideration should avail himself of these ideas.

Within this framework of principles and suggestions, there is latitude for much variety of styles and designs. Of the many that have been developed, there are three which at the present time are of especial importance. The simplest and the one most like that commonly practised in occidental countries is called the ***Nageire*** (thrown in) style. An arrangement in the Nageire style represents a group of plants that might grow near one another at the same time and place. The masters of the Saga school distinguish thirty variants of this style.

The ***Moribana*** (piled up) style represents a bit of landscape or a scene such as one might find beside a pond, in a field or on a mountainside.

The ***Kakka*** (formularized) style, which is the most highly developed of these three, is the one most esteemed by art lovers. The name indicates the thoroughness with which this style has been organized and the great

---

On the opposite page are two compositions in the Kakka style according to the Ikenobo school. Welcome home after a long voyage is expressed in the upper picture. The boat model directed toward the left indicates homeward bound. The overhanging branch suggests the steering oar of the boat. The deep curvature of the sail suggests speed due to strong wind. Success and long life are expressed by the arrangement of the iris and the evergreen in the lower illustration.

number and definiteness of its rules. The experience and taste of generations of eminent masters have offered these many precepts for the guidance of others. Most of their suggestions relate to such esthetic principles as rhythm, balance, harmony and unity. Others relate to such natural phenomena as changes of plant form with changes of season, the development of flowers and foliage with respect to the direction of incident light, peculiarities of certain species as well as the variations of individual specimens of the same species. A composition in the Kakka style has the form of a tree or a tree with flowers at the foot.

To learn the fundamentals of even the first two styles of arrangement requires a prolonged period of study in Japan; to become proficient in flower composition is somewhat comparable to being able to play in a recital.

In an organized course of study, the design of compositions for pure decoration is practised first. During the early lessons, the master speaks little while he arranges the composition in one of the simple styles according to his school. The pupils make sketches and try to copy the model. The master inspects and corrects the copy. The pupils try again and receive a second criticism. Then the pupils take the material home for further practice.

In some schools a pupil on completing a unit of the course, say fifty compositions, receives a certificate of progress and a textbook covering the work already done. Later, the master explains how the esthetic principles are attained in flower arrangements designed for decoration.

Many students do not progress further than decorative composition, ceasing their formal instruction after having completed about one hundred and fifty problems in the Nageire and Moribana styles. Those who do continue, learn the laws of plant growth and additional styles or variants of the styles already considered. Those who aspire to the degree of Flower Master take up the study of the symbolism used for the expression of ideas in compositions for various types of occasions. They also familiarize themselves with a number of traditions which are often symbolically suggested by flower compositions.

To understand this symbolism and to be able to make it speak through branches, leaves and flowers is, to Japanese men and women, a necessary cultural accomplishment. Plants are an element of artistic importance in their lives.

Mr. Ferry has written for a forthcoming number of the Journal an article called "The Making of a Flower Master." In this he depicts, in terms of his own experience while studying in Japan, the method of schooling of Japanese women and men in the national art of flower arrangement.

A New Propagation Method For Hybrid Rhododendrons

By Henry T. Skinner,
Cornell University

RHODODENDRONS and azaleas rank among the most decorative of all garden plants. Popular usage of many of the best of them, however, will remain limited so long as costly production methods raise their price beyond the means of many gardeners who greatly admire this outstanding group.

Clonal lines of the hybrid rhododendrons can only be reproduced by vegetative propagation. In commercial practice grafting and layerage are most commonly employed. Both of these methods are not only slow but also expensive. In grafting, the question often arises as to whether the plant will be as long-lived and vigorous as one upon its own roots. With azaleas the grafted plant is almost certainly inferior, but with rhododendrons this question cannot be so definitely answered.

A number of rhododendron species can be readily propagated by stem cuttings, particularly when treated with the new synthetic growth substances. This phase has already been discussed in considerable detail in an earlier paper.[1] In a series of tests made by the writer, ordinary stem cuttings of the rhododendron hybrids often gave very fair rooting and produced, within a year, quite satisfactory plants. But during these tests a different kind of cutting was also tried—the leaf-bud cutting. With this new type of cutting, results have been so superior that after three years of testing it has seemed worthy of introduction as a new and worth-while method for the nurseryman or for the amateur grower to try out.[2]

The Kind of Cutting. It has been known for many years that the leaves of certain plants will root comparatively easily while stem cuttings of the same plants produce roots poorly or not at all. If such a leaf cutting consists only of lamina and petiole, however, the development of a bud and vegetative shoot may be very long delayed, if it occurs at all. Stoutemeyer and others have used a modified leaf cutting and have found it to be very successful in the propagation of blackberries. This is the "leaf-bud" cutting. It consists not only of lamina and petiole, but of these with axillary bud and a portion of stem attached. This new type of cutting suggested itself for trial with ericaceous plants. Rhododendrons have many leaves to a growth-shoot; if each, by suitable treatment, would root easily and produce a new individual the advantages in conservation of material and

---

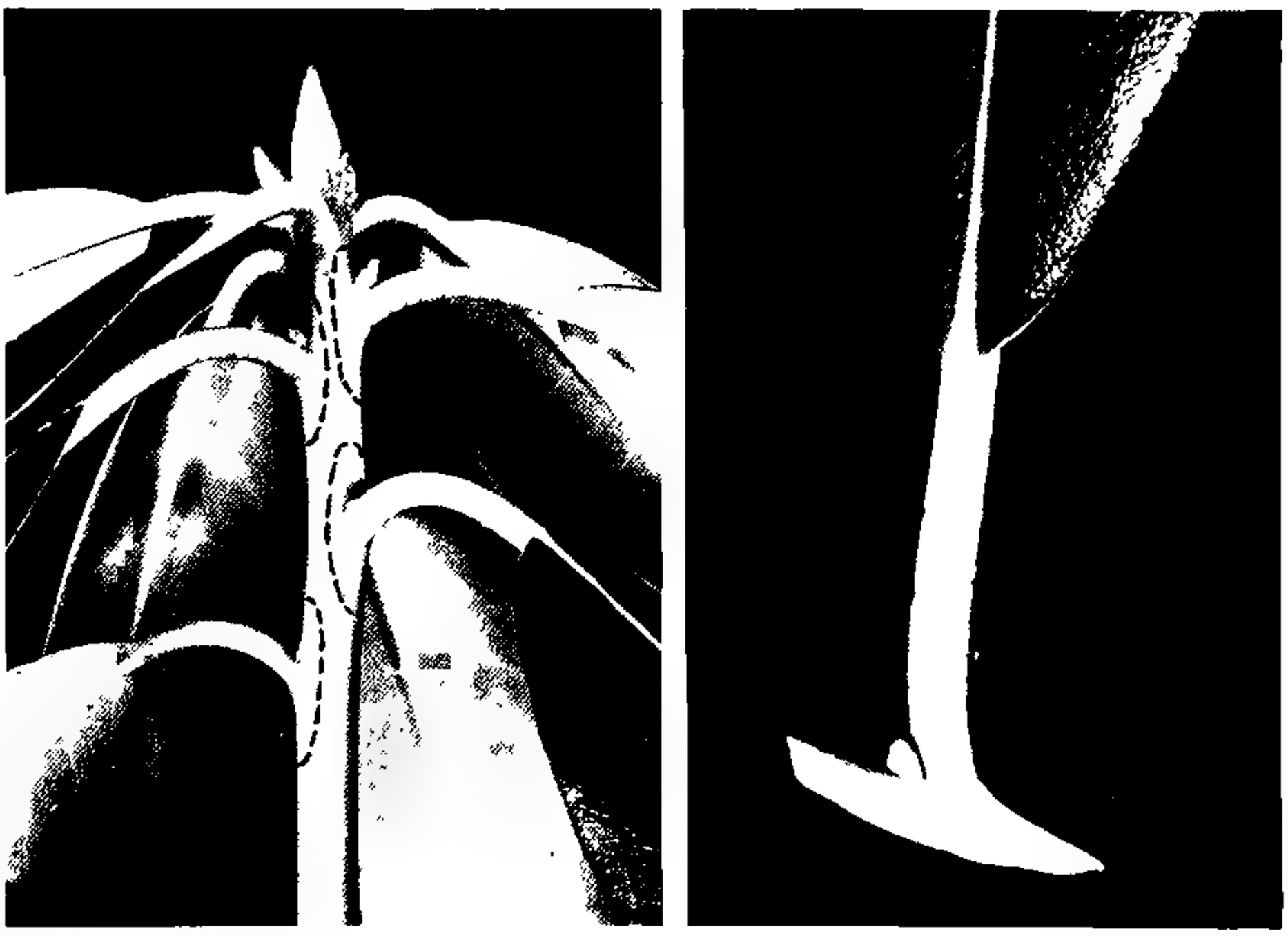
[1] Rooting response of azaleas and other ericaceous plants to auxin treatments. Proc. Am. Soc. Hort. Sci. **35**:830-838 (1937) 1938.

[2] Results of Mr. Skinner's experiments were first announced at the Short Course for Nurserymen at Rutgers University on Feb. 16. This is the initial publication of the method.

in quantity production would be obvious. The suggestion has worked out surprisingly well.

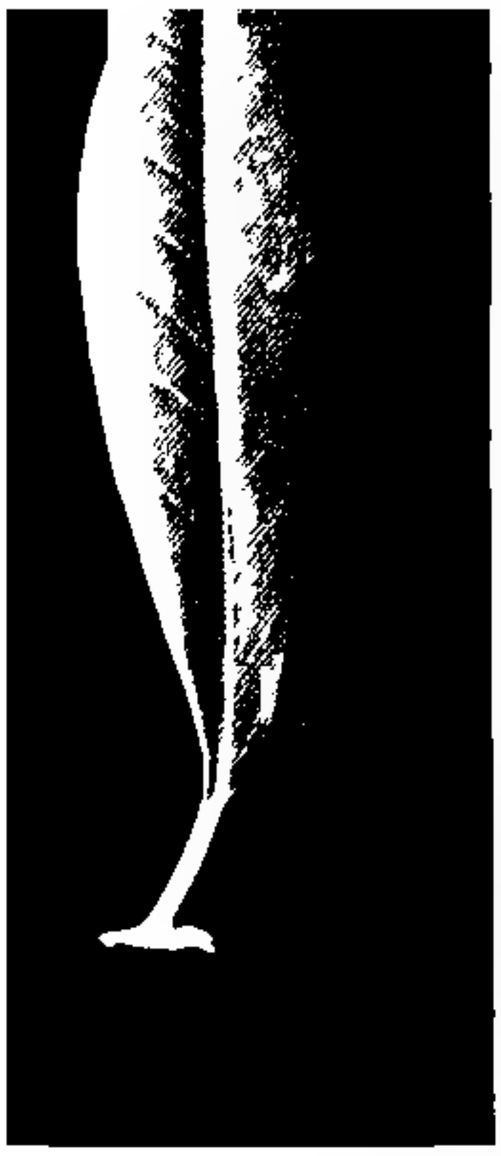
Time of Taking Cuttings. The best time to take leaf-bud cuttings of catawbiense hybrids and such other rhododendrons as have been tried seems to be about the last week of June or in early July. At this time terminal buds have formed upon the current season's growth and the young leaves are fully developed and partially hardened. Bearing this in mind, the actual time chosen will no doubt vary to some extent with the plant variety as well as the locality and conditions under which the stock plants are growing. This same type of leaf cutting has also been rooted quite successfully in late winter. The percentage rooting, however, seems somewhat higher and the time required for rooting shorter when cuttings are taken in summer. November cuttings are being tried for the first time this year. At the time of writing, a month later, they are well callused but have not yet rooted.[3]

Making the Cutting. When the young shoots are in proper condition any fair-sized healthy leaves which bear dormant but visible axillary buds

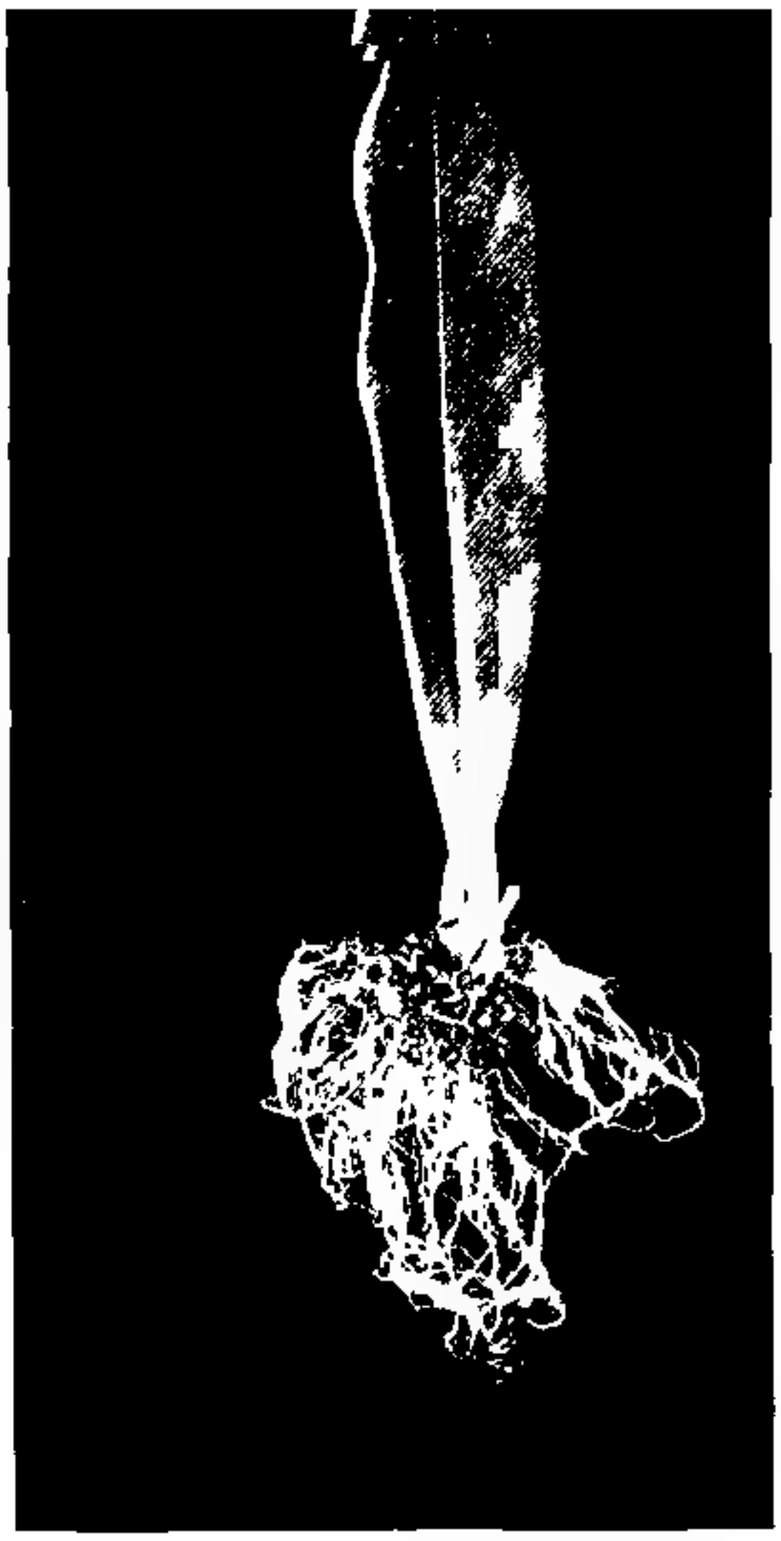


A strong shoot of Rhododendron catawbiense provides five or six leaf-bud cuttings. A single cutting is shown at the right in the position in which it is placed in the sand-and-peatmoss medium in the propagating frame.

[3] By February the percentage rooting was found to be considerably lower than that of comparable summer cuttings, but during March shoot growth was unusually rapid.



e. A leaf-bud cut-
of Rhododendron
um. Right: Its root
opment a few weeks
later.



At right Root-ball and shoot of R. decorum approximately five months after the cutting had been taken.

can be taken from them as cuttings. Each leaf is removed from the stem with a sharp knife so that the axillary bud and a portion of wood and bark, about ¾ inch long, remain attached to the base of the petiole. Toward the top of the shoot the leaves are often so closely clustered that only every other one can be conveniently used. A normally vigorous shoot of a variety such as *R. catawbiense* ***Roseum Elegans*** will furnish as many as six or more cuttings. Ordinary precautions to prevent undue water loss during handling should of course be taken; it is well to wrap the shoots in moist burlap as soon as they are gathered and keep the leaves themselves continually moist.

Rooting. Closed grafting frames within the greenhouse have been found satisfactory for rooting. Outdoor frames would doubtless serve the purpose, provided that the sashes fit tightly, for a moist atmosphere above the cuttings is very necessary. A bottom temperature of 70-75° F. is evidently about right. Electric cable gives perhaps the ideal heat, for it can be regulated so simply.

The most efficient rooting medium that we have used has been composed of 3 parts New Jersey quartz sand to 2 parts of peatmoss. In all cases this has proved decidedly better than either peat or sand alone.

The cuttings are set in the normal way in rows about 2 inches apart, with the leaves upright and just touching in the row, though not overlapping, for plenty of light must be allowed to reach each leaf. The cutting

is buried to about the length of the petiole. The rooting medium should be just firmed, but not pressed hard, and as soon as an area is filled the cuttings can be settled into place by watering.

Chemical Treatments. Many leaf-bud cuttings will root entirely satisfactorily without chemical treatments. It has been found, however, that the growth substances do give a rather better root system and certainly reduce the rooting time by two or three weeks. If indolebutyric acid is used, a treatment of about 6 milligrams of acid per 100 cc. of water is recommended, the cuttings being soaked in it in the normal way for 8 to 24 hours before placing them in the rooting medium. This is equivalent to a 60 B.T.I. unit application of Hormodin.

The dust compounds have not, up to the present time, proved quite as effective as the liquid treatments, but they are considerably simpler to use and materially reduce the usual time required for rooting.

If properly handled, and whether chemically treated or not, it has been found that 80 to 100 percent of the cuttings taken from such varieties as ***Boule de Neige*** and ***Roseum Elegans*** will normally root well.

Care During Rooting. The care of leaf-bud cuttings is no different from that accorded to any ordinary softwood cuttings. Shading will be required on sunny days and an occasional top syringing when the leaves become dry. The rooting medium must not be allowed to dry out but at the same time it should not be kept too wet or bad effects will very quickly be noticeable.

Cuttings set in late June and treated with indolebutyric acid usually make good root systems in about ten weeks; untreated cuttings will require about three weeks longer.

ted plants of R. ponticum and of the catawbiense hybrids Boule de Neige and Roseum Elegans, from left ght, as they appeared in early December. Cuttings had been taken on June 28.

After Handling. As soon as the cuttings have made a sizeable root ball it has been found practical to pot them in 2¼-inch rose pots in a soil mixture composed of acid wood soil, peatmoss and quartz sand. In potting it is well to keep the basal bud as close to the soil surface as conveniently possible. The rooted cuttings are then placed on the greenhouse bench and kept at a fairly high temperature (75 to 80° F.) to induce breaking of the basal buds.

Some difficulty was at first experienced in securing satisfactory shoot growth from the rooted cuttings. Various light and temperature treatments were tried and it was found that temperature is apparently the controlling factor; 65° F. is too low to induce proper breaking of the buds. An 18-hour day, attained by the use of 75-watt bulbs suspended 3 feet above the cuttings, in addition to the high temperature, will induce rather more rapid shoot growth, but at 75° F. the buds will break quite satisfactorily without this additional light.

The ease with which shoot growth can be obtained from the axillary buds is variable with different species. *Rhododendron ponticum* breaks very readily indeed; in fact, cuttings of this plant will frequently produce shoots an inch or two long while still in the propagating frame. The catawbiense hybrids seldom break their buds this early.

An occasional liquid feeding with a dilute solution of sulphate of ammonia (1 tablespoonful to 3 gallons of water) or a small amount of an organic nitrogenous fertilizer such as tankage or cottonseed meal added to the potting mixture may encourage more rapid vegetative growth.

Cuttings made in late June and potted the second week in September if immediately carried on at a warm temperature will usually have developed shoots 3 or 4 inches long by early November. The 1 to 15 percent which have not started by this time will probably be found to have had their buds damaged in some way and may better be discarded.

The young plants can be kept in continuous growth by holding them at a warm temperature. It might be more practical, however, to harden them off at this stage and store them in a cool place until they can be planted in prepared beds outside in early spring. With proper care and the provision of good growing conditions, rhododendron plants from 12 to 18 inches high can be produced from a single leaf within a year.

The writer has rooted leaves of *R. ponticum* during July and secured plants of sufficient size in eight months for them to be used quite successfully as understocks for grafting in March. Such plants were of course maintained in a state of more or less continuous growth.

Varietal Response. It will remain for much wider experimentation than has been possible at this early date to determine what species and varieties of rhododendrons can be satisfactorily propagated by leaf-bud cuttings. In the tests upon which this report is based, *R. ponticum* has

Plants of three species of Rhododendron sixteen months old from leaf-bud cuttings. From left to right: R. catawbiense, R. decorum, and R. ponticum.

given the most ready response of any plant so far tried. With due care as high as 95 percent of the cuttings taken of this species will root without difficulty and produce new plants within a few weeks. It would seem logical that rhododendron hybrids in which the blood of this species predominates might also be looked to as likely subjects for experimentation.

Of the hybrids of *Rhododendron catawbiense*, three only have been handled but all of them with very fair success. These three were: ***Boule de Neige, Purpureum Elegans*** and ***Roseum Elegans.*** Of these, ***Roseum Elegans*** gave the most rapid response while ***Purpureum Elegans*** was the slowest. On an average, about 80-85 percent of all leaf-bud cuttings taken ultimately developed into new plants.

R. decorum responds readily. Rhododendrons *carolinianum* and *minus,* on the other hand, have proved very slow to root; they may take sixteen weeks or longer. Once rooted, they produce plants quite well, but, because of the time involved, propagation of these plants by leaf-bud cuttings is not at present considered to be practical. The same is true of *R. laetevirens* and may possibly be found to apply to other small-leaved plants. *R. laetevirens* can be propagated much more readily by stem cuttings. *R. maximum* has given the poorest response of any. The difficulty again is in rooting. The rooting percentages with this plant may ultimately be

as high as 90 percent but not until after 16 or 20 weeks in the propagating bench, which is a very long time to wait.

Among related plants, *Pieris japonica* and *Leucothoë Catesbaei* have both been found very easy to handle by this method. The mountain laurel, *Kalmia latifolia,* on the other hand, remains extremely slow. Possible ways of speeding the rooting of these slower plants are being investigated at the present time. The only azalea so far tried was *R. japonicum* and it gave no response at all. But the cuttings were taken rather late in summer and for that reason it should not, perhaps, be considered a fair test.

Advantages. For those plants with which it is successful the leaf-bud method appears to be both an economical and rapid system of propagation. A shoot growth which, in grafting, will make only one cion and provide one plant, will furnish five, six, or more leaf-bud cuttings. Each of these will produce an individual fully as large as the grafted plant in about one-third of the time.

From the practical standpoint the chief interest of this method centers around its value as a means of quickly reproducing such forms of the large-leaved hybrid rhododendrons as at present can only be vegetatively propagated by grafting or layering. Of these hybrids the horticultural varieties of *R. catawbiense* are of first importance to those who happen to have their gardens in the northeastern United States. At least some forms appear to respond quite well. It will be interesting to discover just how many species and varieties can actually be handled by this method; it will be equally interesting to find how practical the propagation of rhododendrons by leaf-bud cuttings will ultimately prove to be.

Begonias Bring Three Awards To Botanical Garden

THE begonias in a hundred varieties which The New York Botanical Garden displayed last month at the International Flower Show won for the Garden two gold medals and a special prize. One gold medal was the Sarah Tod Bulkley award of the Garden Club of America, given in recognition of the "great variety and high horticultural merit and the beauty of the display." It was presented at the annual luncheon of the organization March 15 at the Waldorf-Astoria by Mrs. Samuel Seabury, President of the Garden Club of America, and was received on behalf of the Garden by Dr. William J. Robbins, Director. Both Mrs. Seabury and Mrs. Bulkley are members of the Corporation and the Advisory Council of The New York Botanical Garden.

An unexpected feature of the Flower Show collection was a plant which began to bloom for the first time just before the show opened. A piece of

Part of the exhibit of a hundred different kinds of fibrous-rooted begonias which won special honors for The New York Botanical Garden at the International Flower Show in March.

the rhizome had been sent last year by Thomas MacDougall, while he was collecting for the Garden in the mountains of Oaxaca, southern Mexico. So far as is yet known, the plant represents an unidentified species. While it is not outstanding in its beauty, it offers good possibilities both as a decorative specimen and as a parent for some interesting new forms. Standing only about 7 inches above the pot, it spreads over a diameter of 20 inches, with large, irregular, maple-shaped leaves, slightly hairy, bright green, and marked with silvery white at the junctions of the veins. The flowers, which open from bright green buds, gradually turn white. While there were only a few flowers on the plant at the time of the show, there seemed to be more than a hundred buds arising beneath the leaves.

The begonias which comprised the display ranged from brilliantly flowered dwarf plants, only a few inches high, to specimens standing ten feet and more above their pots in the background. While nearly every specimen was exhibited in full bloom, a few were noteworthy for their highly decorative leaves. In color of flower they ranged from pure white through pink and orange to scarlet. They were effectively shown against a backdrop of plum-colored draperies, with three large printed cards above describing begonias in general, the culture of begonias, and begonias at The New York Botanical Garden, explaining how the Garden's large collection serves as a basis for horticultural and scientific research.

Sir William Wright Smith a Visitor

THE British flag flew beside the American at the Museum Building on Wednesday, March 15, when Sir William Wright Smith, Regius Keeper of the Royal Botanic Garden at Edinburgh, paid an official visit to The New York Botanical Garden.

Sir William, Lady Wright Smith, and Dr. Alexander Nelson of the Botanic Garden's staff in Edinburgh were in America as guests of the Horticultural Societies of New York, Boston, and Philadelphia at the time of the three great spring flower shows. Sir William's visit to the Garden preceded the annual luncheon of the Garden Club of America, at which he and his party were guests of honor and he was principal speaker.

In his tour of the grounds and conservatories at the Botanical Garden during the morning, Sir William showed special interest in the topography of the park, including the gorge of the Bronx River, and in the general plantings. In Range I he remarked particularly about the naturalistic plantings of the cacti and other succulents, the ferns, and especially the tropical rain-forest, and expressed the opinion that the banyan tree in the floral display house was the finest one he had ever seen in cultivation.

Before leaving for the luncheon, he conversed with members of the staff in the Director's office.

WITH SIR WILLIAM WRIGHT SMITH IN THE DISPLAY HOUSE
Left to right: Dr. B. O. Dodge, Sir William, H. de la Montagne, T. H. Everett, Dr. H. A. Gleason, and Dr. William J. Robbins.

Microbiologists Coming To New York In September

SCIENTISTS from every continent are expected at the Third International Congress for Microbiologists, which will take place in New York September 2 to 9. Dr. B. O. Dodge, of the New York Botanical Garden, is a member of the executive committee and of the local group which is making plans for the conference. Mrs. Dodge is assisting at plans for the entertainment of the women who attend.

The program, which will be in nine sections, will consist of discussions on general biology: variation and taxonomy (I), and microbiological chemistry and physiology (II); viruses and viral diseases (III); rickettsiae and rickettsial diseases (IV); protozoology and parasitolgy (V); fungi and fungous diseases (VI); medical and veterinary bacteriology (VII); agricultural and industrial microbiology (VIII); and immunology (IX).

Dr. R. A. Harper, Professor Emeritus of Botany at Columbia University and a member of the Board of Managers of The New York Botanical Garden, is president of the section on fungi and fungous diseases, which includes bacterial diseases of plants. Dr. Dodge is convener for this section. The committee consists of Dr. Rhoda Benham, New York; Dr. H. M. Fitzpatrick, Ithaca; Dr. Michael Levine, New York; Dr. George M. Lewis, New York; Dr. George M. Reed, Brooklyn; Dr. William J. Robbins and Dr. Fred J. Seaver, New York; and Dr. Fred D. Weidman, Philadelphia.

Dr. J. S. Karling of Columbia University is recorder and Dr. J. Gardner Hopkins, College of Physicians and Surgeons, is secretary of the section.

The tentative program of Section VI will consist of a group of papers comparing fungous infections of plants and animals in their host-parasite relations; a series on growth substances for fungi, which is being organized and will be led by Dr. Robbins; effects of micro-organisms and chemical substances on a typical growth in plants, in which Professor C. Y. Chiao of Nanking, who spent the summer of 1934 at The New York Botanical Garden, is scheduled to give a paper; sex, variation and genetics of the fungi; and fungi as parasites of man.

There will be a joint session with section I, on variation and taxonomy, to consider classification of some of the higher fungi.

Officers of the Congress are T. M. Rivers, M.D., President; M. H. Dawson, M.D., General Secretary; Kenneth Goodner, Ph.D., General Treasurer.

E. B. Southwick

EDMUND BRONK SOUTHWICK, who was for seventeen years (1918-34) Custodian of the Herbaceous Grounds of The New York Botanical Garden, died at his home in the borough of Manhattan, New York City, December 18, 1938.

He claimed direct descent from Jonas Bronck, the early Danish settler in Dutch New Amsterdam, from whom Bronx River derived its name; and, indirectly, Bronx Park and Bronx Borough.

He was born at New Baltimore, New York, on the west bank of the Hudson, in Greene County, April 28, 1848. His interest in nature dated from his early years, and was centered particularly in botany and entomology. Most of his earlier insect collections went to the American Museum of Natural History; a later one was housed in the Mansion of the Botanical Garden, and was consumed in the fire that destroyed that building in 1923. For years he was City Entomologist, with an office in the old Arsenal in Central Park; while there, he developed a Shakespeare Garden that attracted much attention.

He was in his seventieth year when he entered the service of The New York Botanical Garden, in March 1918, and in the following year commenced the first rock garden, over which he exercised supervision during the remainder of his active connection with this institution. From the beginning of the year 1924 he was listed as a member of the scientific staff.

His published papers were not numerous. The earlier ones were chiefly entomological, the later ones chiefly botanical and horticultural. He was a quiet gentleman, not exactly bashful or reticent, but modest and unobtrusive. This probably accounts for the limited

product of his pen, as well as for the fact that his record will be sought in vain in such works of reference as American Men of Science and the various Who's Who books.

His society memberships included the New York Entomological Society, the Torrey Botanical Club, the New York Academy of Sciences, the New York Historical Society, and the Horticultural Society of New York. In the days of the old New York State Forestry Association, nearly thirty years before the establishment in 1913 of the later organization bearing the same name, he was its recording secretary.

Exchange Student Gardeners

THE first exchange of student gardeners with the Royal Botanic Garden in Edinburgh goes into effect this month. Donald Samson, who has been with The New York Botanical Garden since July 1937, is leaving for a year in Scotland, and about April 15 John Elliott will arrive at The New York Botanical Garden from Edinburgh. The son of Clarence Elliott, one of the foremost of British rock gardeners, he has previously been away from Edinburgh for six months constructing a rock garden for an Indian Maharajah.

* * *

Samuel Bridge has been chosen as the 1939 exchange student gardener for the Royal Botanic Gardens at Kew. He was the final selection from among five applicants, of whom three were interviewed by a committee from the National Association of Gardeners at a conference during Flower Show Week. Mr. Bridge was employed under Thomas Little on the estate of Col. Robert H. Montgomery at Cos Cob, Conn., before becoming a student at the Garden.

* * *

Stephen G. Cutting, who was exchange student gardener to Kew Gardens in 1937, and who completed The New York Botanical Garden's science course for professional gardeners just before leaving for England that year, has become head gardener on the estate of J. Hale Steinman, newspaper publisher, at Lancaster, Pa.

Gardeners Forum

THE season's scheduled activities of the Gardeners Forum, the unofficial organization of the student gardeners, closed on April 5 with a program of extemporaneous three-minute speeches by each member present.

Beginning in October, the meetings have been devoted to addresses on horticultural topics, followed by discussions led by the speaker of the evening. Following are the titles of the papers and the speakers:

"Conifers," A. J. Bisaillon; "Opportunities in Horticulture for the Trained Gardener," Wilbur Wright; "Research and its Relation to Horticulture," John Bachman; "Vines and Ground-covers," Philip Spear; "Annuals," Ronald Kramer; "Trees," Lawrence Connolly; "Composting and Some Experiments in the Sterilization of Soil," Philip Chandler; "Plants in New York City," Harry Ford; "Native Plants Preferred," Robert Simpson; and "Lawns," Raymond Ewing

Notes, News, and Comment

Daylily Week. Gardeners, garden club members, commercial growers, and others who may be interested are openly invited to The New York Botanical Garden during Daylily Week, which will be the last of June, ending July 1. In the experimental fields to the rear of the Museum Building, there will be an opportunity to see new forms of Hemerocallis in the making. Many unnamed seedlings are being grown there and the best of them are being hybridized to produce new plants of superior coloring and fragrance, improved habit of growth, and longer blooming period. Bordering the walk adjacent to the experimental beds there will be on view more than 250 named species and horticultural clones, all labeled, and the majority of them will be at the height of their bloom. Special events for the week will be announced later. The viewing of the daylily beds and attendance at the program will both be open to the public without charge.

Rose Conference. Plans for a two-day conference on roses are now being made and will be announced in next month's Journal. It will take place at The New

York Botanical Garden early in June, when the roses are at the height of their bloom. A conducted tour of the rose garden and of other horticultural features of the grounds will be included in the program.

Shade Tree Papers. The *Proceedings* of the Eastern Shade Tree Conference, which took place at The New York Botanical Garden Dec. 8-9, have now been published and distributed to those who subscribed. The 27 papers, covering chiefly the damage to shade trees in the September hurricane and consideration of means of rehabilitation, fill 99 pages of text and are illustrated with some excellent half-tone plates. Additional copies may be ordered by sending a check for two dollars to E. J. Countey, New York Botanical Garden, who has been made custodian of the Conference funds.

Easter Display. Following a succession of brilliant displays of flowering plants in garden arrangement in two houses of Range 1, The New York Botanical Garden is installing a special Easter display which will be open to the public daily, including Sunday, at the usual hours, from 10 a.m. to 4:30 p.m. Information on memberships, courses, and publications of the Garden is now available every Sunday at the conservatory.

In addition to 100 pots of Easter lilies, the new display will include many primulas, stocks, cinerarias, begonias, and clivias; such shrubby plants as azaleas, genistas, and astilbes; hyacinths, tulips, narcissi, and callas; and a large number of the South African annuals, including species of Nemesia, Ursinia, Dimorphotheca, Venidium, Arctotis, and a number of others. Orchids will be planted in a naturalistic arrangement, and there will be other decorative plants which are seldom seen outside of a Botanical Garden collection.

John H. Schaffner. More than forty years of service with the department of botany at Ohio State University came to an end on January 27 with the death of Dr. John H. Schaffner at the age of 72. Since 1928 he had been research professor. He was formerly head of the department. Long famed for his work on the reproduction processes in plants, in recent years he became known also for his work in phylogeny. He was one of the first to see and correctly interpret the process of meiosis (reduction division in the chromosomes) in plants. Of late his principal work was on sex reversal and plant rejuvenation. Taxonomically, he did outstanding work on *Equisetum.*

Visitors. Professor A. H. Reginald Buller of Winnipeg and London spent a week at the Garden in February investigating literature in preparation for his seventh volume of research on the fungi. Among other recent visitors at the Garden are M. A. Chrysler, New Brunswick; John C. Wister, Philadelphia; Edgar T. Wherry, Philadelphia; Dow V. Baxter, Ann Arbor; G. W. Martin, Iowa City; Harold A. Senn, Ottawa; José Cuatrecasas, Madrid; E. C. Auchter, Washington; and E. D. Merrill, Jamaica Plain.

Dr. Buller was invited to give a special lecture at Columbia University Feb. 21 to botanists in the vicinity of New York. He spoke on sex mechanism in the rusts, referring especially to what he calls "diploidization."

Conference. Motion pictures of the Terry-Holden Expedition to British Guiana during the winter of 1937-38 were shown by William G. Hassler, expedition photographer, at the meeting of the staff and registered students of the Garden March 10. Dr. A. C. Smith, who was a member of the expedition, introduced Mr. Hassler.

Activities. Dr. William J. Robbins addressed the Barnard Botanical Club March 10 on the subject of sugar, and in the evening spoke before the Biology Alumni of Brooklyn College on plant tissue culture. The following day he served as chairman of the judges on individual exhibits of plants and animals at the Science and Engineering Fair of the American Institute, held at the American Museum of Natural History.

Elizabeth C. Hall lectured Jan. 9 at The Flushing Garden Club on "Arm Chair Gardening."

Dr. W. H. Camp talked Jan. 12 at Boston before a joint session of the Massachusetts Horticultural Society and the New England Wild Flower Preservation Society on "Hunting Wild Flowers in Mexico."

Assistant. Nicholas Pecora, who completed the science course for the student gardeners a year ago, has been trans-

ferred from the gardening staff to become an assistant to Dr. B. O. Dodge, with whom he will work on the control of diseases and pests.

Radio. During Flower Show Week, T. H. Everett described the Garden's begonia exhibit, assisted by Miss Lillian Bostock (Mrs. W. E. Weber) over station WMCA. Questions and answers were used to bring out the highlights of the display and to explain begonia culture, especially of the varieties which can be grown as house-plants.

Japanese Algae. Among the herbarium specimens of particular interest which the Garden has received by exchange during the past year are 137 marine algae from Japan, sent by Professor Yukio Yamada of the Institute of Algological Research, Hokkaido Imperial University at Sapporo, Japan.

The specimens sent to the Garden, which are all in exceptionally fine condition, are in many cases newly described species, while many others represent new localities.

Ninety specimens received are from the herbarium of the late Doctor Kintarô Okamura, who was Professor Emeritus of the Imperial Fisheries Institute. Some from Yonakuni and the middle Kurile Island are especially interesting material.

Committee. T. H. Everett has been appointed to the Labeling Committee of Hortus, Inc., which will have charge of the labeling of all plants exhibited at the New York World's Fair.

Half a Century. At the time The New York Botanical was just beginning to take form in the minds of its ambitious founders, the region around "the new Bronx Park" was being advertised as a "handsome suburban quarter." Today the park is surrounded by apartments.

A copy of *The World* for Sunday, March 10, 1889, which recently came to light around some old herbarium specimens, contains the following item in its real estate columns:

Fine Residences For Sale,
From $16,000 to $25,000;
ALSO BUILDING PLOTS
in the
HANDSOME SUBURBAN QUARTER,
Bedford Park,
IN THE CITY OF NEW YORK;

eighteen minutes' expresss by Harlem Railroad from Grand Central Depot to Bedford Park station, on the premises; within five minutes' walk of the houses, which are of varied styles of architecture, in stone, brick and frame combined; replete with all modern conveniences; cabinet trimmed, plate-glass windows, electric bells Croton, baths, gas, &c., &c, and are built on beautifully laid out and shaded avenues, and surrounded with handsome grounds. Over twenty-five houses have already been sold in this delightful place, which are now occupied by their owners Bedford Park is adjacent to the new Bronx Park and the Mosholu Parkway, and is also within easy driving distance of Central Park, over Jerome ave. A club stable has been erected within a suitable distance of the park for the exclusive use of the residents. Watchmen on the premises, or for full particulars, photographs, &c, apply to the owners, 111 Broadway (Trinity Building), room 90.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

For Cactus Enthusiasts

CACTI FOR THE AMATEUR. Scott E. Haselton. 142 pages, indexed and illustrated. Abbey Garden Press, Pasadena, 1938. $1 in paper, $1.50 in cloth.

With its clear-cut text and helpful illustrations, this is such a thoroughly practical book on cactus culture that we are tempted to quote the author in his own review of the book which appeared in his own magazine, the *Cactus and Succulent Journal.* ("After all," he asks, "who knows better than the author what his aims were in publishing such a book?")

"For ten years," he writes, "we have received thousands of requests for information from growers possessing only a few cacti. How can I grow cacti?

. . . Which kinds are most desirable? . . Can I grow them from seed? How can I graft cacti? . Will cacti grow in cold climates? . . In this book we have tried to answer these questions and many more. We have endeavored to show in pictures and text that cacti can be grown in city apartments in New York, in mountain cabins, house trailers, or desert estates. There are no more adaptable plants than cacti and they will patiently withstand moves from place to place or periods of neglect. . This new book has aimed to bring the experiences of many growers to those who are just beginners."

We quite agree with the author that it is an excellent book for beginners and a useful one as well to experienced growers. It is attractively printed and it sells at a price that any cactus enthusiast can afford.

CAROL H. WOODWARD.

Maximov in a New Revised Edition

PLANT PHYSIOLOGY Nicolai A. Maximov. Edited by R. B. Harvey and A. E. Murneek. 2nd English edition translated and revised from the fifth Russian edition. 473 pages, 144 figures. McGraw-Hill, New York and London. 1938. $4.50.

The translation from the Russian was made by Irene V. Krassovsky, and the book as edited and revised by Harvey and Murneek is better than the earlier English translation from the first and second Russian editions. The material in the book has been rearranged and brought up to date. The chapter headings in this edition cover physicochemical organization, chemical composition and metabolism, respiration, growth, carbon assimilation, assimilation of nitrogen, absorption of mineral elements, water relations, translocation, resistance to unfavorable environmental conditions, correlations and vegetative reproduction, physiology of development, flowering and ripening, periodicity.

The translator and editors made fewer errors in this edition than in the earlier one, and the English is improved, though it would be preferable to substitute in many instances the word "because" or "since" for the longer and more awkward phrase "due to the fact that" which is frequently used. This and a few other expressions commonly used by scientists are a kind of scientific slang, the elimination of which would be desirable, though perhaps unattainable.

Some will criticize the use of the word "plasma" for protoplasm or cytoplasm on page 16; others will object to the indifferent quality of the illustrations and the infrequency of original figures; still others will feel that the first two chapters are a severe introduction to the subject for beginning students. On the whole, however, the present translation, in the opinion of the reviewer, will prove to be one of the most useful books on plant physiology for student use.

W. J. ROBBINS.

A New Type of Gardening

BIO-DYNAMIC FARMING AND GARDENING. Ehrenfried Pfeiffer. 220 pages, illustrated; bibliography. Anthroposophic Press, New York. 1938. $2.25.

Bio-Dynamic Farming and Gardening by Ehrenfried Pfeiffer is an unusual book.

Its unusualness lies not mainly in the facts presented soil scientists in general accept most of these facts. But the interpretation of these facts is made the basis of a system of soil management quite different from that in vogue in this country.

All experienced growers know that plants are living organisms which require for their best growth many complex, interrelated factors some of which are not understood and some of which may not even be known. To this idea the author adds the concept that "the cultivated field is a living organism, a living entity in the totality of its processes."

If the farmer or gardener can neither understand nor adjust nor supply all of the essential factors of optimum plant growth, Mr. Pfeiffer proposes methods by which the grower sets up natural conditions for plant growth in such a way as to depend on Nature to do the job well in all its complex details.

No mineral, inorganic fertilizers or sprays are used. The plant nutrients supplied by the grower are all in the organic form. They are carried by farm manures which are prepared in a special manner and by other plant and animal tissues which are composted in a special way. These special methods for preparing manures and compost include inoculation with selected bacteria which cause the right kind of fermentation.

Spray materials recommended are also all organic.

These organic materials which are used for controlled fermentation of manures and compost, for sprays to provide the plant with resistance to disease and insect pests and for growth promotion effects on the plants are called "plant preparations." These unanalyzable "plant preparations" are made, for the most part, from selected wild plants and weeds.

The book is readable, thought provoking and concise. Specific directions are given to enable the reader to follow this system called "Bio-Dynamic Farming and Gardening."

The author is a cultured gentleman who presents his thesis, in the book and in lectures, in a conservative manner. He shows no spirit of antagonism to others who may not agree with him.

F. C. HERSMAN,
Long Island Institute of Applied Agriculture.

North American Fern List

INDEX TO NORTH AMERICAN FERNS. Compiled and edited by Maurice Broun. 217 pages, indexed. Published by the compiler, Orleans, Mass. 1938. $2.50.

As pointed out in Mr. Charles A Weatherby's foreword and in the compiler's preface, the need of an index to North American ferns has been keenly felt for years by both specialists and beginning students of the group. Earlier check-lists are entirely out of date, and Christensen's comprehensive Index Filicum does not include the names of subspecific groups.

The present volume, therefore, has a definite place in the fern student's library; reference to it will save him a great amount of time, effort, and error. A brief systematic outline of North American ferns is followed by an alphabetical list of accepted genera, species, and smaller groups, with synonyms. In regard to taxonomy, Mr. Broun has followed Christensen as much as possible rather than to attempt arbitrarily to interpret generic and specific limits.

A brief statement of the habitat and range of most species has been contributed by Dr. Edgar T. Wherry, and this portion of the work should be of especial value to field workers. A total of 356 species, 223 forms, and 110 varieties are treated. A useful list of authorities cited, by Dr. J. H. Barnhart, and a complete index make the volume easy to consult.

A considerable number of new names appears in the volume, because of changes in status. Although it is doubtless desirable for these expressions of the compiler's opinion to be set down, they might have first appeared to better advantage in some botanical journal of wide circulation.

A. C. SMITH.

Textbook on Physiology

THE PHYSIOLOGY OF PLANTS. William Seifriz. 315 pages, 95 figs., indexed. Wiley, New York, 1938. $3.50.

This elementary text on plant physiology covers the following topics: colloidal state, soil, protoplasm, cell, osmosis and entrance of water, ascent, use, loss and storage of water, acidity, salt requirement, permeability and protoplasmic membrane, photosynthesis, respiration, carbon and nitrogen cycles, movement and storage of foods, foods, cellulose and cell wall, plant products, hormones and growth regulators, growth, plant cultures, reproduction, movement, plant associations, environment, living and non living. The figures are clear and many are original. The chief advantage of the book is the introduction of new material not found in many texts, for example, a discussion of plant tissue culture, of the more recent knowledge of the structure of the cell wall, of hormones and auxins

As might be anticipated, the author emphasizes those subjects in which he has been particularly interested, for instance, the structure of protoplasm, permeability, the cell wall. More adequate treatment of mineral nutrition, water relations and certain other aspects of physiology would be desirable from the standpoint of students in agricultural colleges. In fact, it would, perhaps have been better to give fuller treatment of fundamental subjects and reduce or eliminate some of the less essential items discussed, though this is always a difficult matter to decide. The illustration from Stephen Hales (p. 6) demonstrates absorption, not root pressure; the concept of limiting factors, usually considered important, is not discussed; there is a lack of clarity at times perhaps because of the brevity of treatment; for instance, the dis-

cussion of translocation. It is encouraging to note, however, that texts on plant physiology by American authors are appearing.

W. J. ROBBINS.

Gardening, Complete

THE GARDEN DICTIONARY. Edited by Norman Taylor. 888 pages, illustrated. Houghton Mifflin, Boston and New York, 1938. $7.50.

So much has been said about this book since the first edition appeared about three years ago for subscription sale at $16.25 that little can be added today except to call attention to the more favorable price at which the book has been placed in stores for general sale. Meanwhile, it might be added, its editor has received a gold medal from the Massachusetts Horticultural Society in recognition of his work on this useful volume.

The reference of each plant to the colored map showing zones of hardiness in North America remains the outstanding feature of the book.

Other commendable features are the alphabetical inclusion of common and horticultural as well as botanical names, the key to pronunciation, mention of the family and origin of each plant, explanation of specific names, articles on garden operations such as potting, spraying and dusting, and abundance of cross references. Tables give such useful information as the number of plants per acre, number of seeds to a pound, the bearing age of fruit trees, and average yields of fruits and vegetables; and a calendar summarizes the blooming dates of plants and enumerates garden tasks month by month.

CAROL H. WOODWARD.

Landscape Gardening For The Home

THE ART OF HOME LANDSCAPE. M. E. Bottomley. 239 pages, illustrated by George Roth, Jr.; indexed. De La Mare, New York, 1935. $3.50.

The quality of much that has been written makes it natural for some of us to approach a book on landscape architecture with a prejudice. But as I read to the end of Bottomley's book my prejudice disappeared completely. A second reading brought out even more of value in this excellent text. For the author, with a fluent and logical style, has the gift of transferring his vast experience to the reader's imagination, so that pictures are formed in the reader's mind as he progresses through the book.

The practical and decorative values of different styles of planting are presented in a manner that makes study of this volume an adventure. The thoroughness of the treatment makes the book of benefit to professionals and amateurs alike. It is a work which should not be missed by anyone who is even remotely interested in landscaping.

A. C. PFANDER.

Diatoms

DIATOMACEAE. Robert Hagelstein. Scientific Survey of Porto Rico and the Virgin Islands. Volume VIII, Part 3. Paper covered. Pages 313-450. Indexed and illustrated. Published by the New York Academy of Sciences, New York, 1939. $2.

As part of its scientific survey of Porto Rico and the Virgin Islands, the New York Academy of Sciences issued on Jan. 19 Part 3 of Volume VIII, dealing with the Diatomaceae. The author is Robert Hagelstein, and much of the research material, both specimens and writings, has come from his own private collections.

In the 138 pages of the text, he takes up in alphabetical order more than 900 forms of diatoms. The index lists the synonyms and other incidental names Forty-two new species and varieties are described and illustrated with photographs, which are reproduced by the collotype full-tone process in exceptionally fine detail. In all, 95 photographs appear, most of the plants being enlarged 1,000 diameters.

Of the several thousand citations in the book, all but two have been taken directly from the original publication. Full names and dates of authors have been supplied by Dr. John Hendley Barnhart, serving in the double capacity of editor for the Academy and as bibliographer for The New York Botanical Garden, of which Mr. Hagelstein is an honorary curator.

The entire paper is an impressive and admirable piece of work, from the apparent completeness of the research and accuracy of its presentation, to the remarkably clear typography and illustrations.

CAROL H. WOODWARD.

Brief Notes on Varied Books

Bibliography

SCIENTIAE NATURALIS BIBLIOGRAPHIA. Dr. W. Junk. The Hague, 1938. $1.60 a year.

A useful—in fact, an almost indispensable—periodical for those who need to keep abreast of recent publications in biology is *Scientiae Naturalis Bibliographia*, edited by W. Junk and published in The Hague. This is the second year of this periodical, the first volume of which, in two numbers, contained about 1,200 titles in many languages, including the Slavic. The present number contains more than 900 titles, and the editor begs to be informed of official or private publications not in general circulation.

New York Guide

A KEY TO NEW YORK. Rosalie Slocum and Ann Todd. Paper covered. 312 pages; indexed and illustrated. Modern Age Books, Inc., New York, 1939. 95c.

An exceptionally useful guidebook designed especially for young people has been prepared, pointing out many unusual, often amusing, things in the big museums, and taking the reader into out-of-the-way corners where he can frequently find the most interesting things of all.

A good example of the style of the book is given in one of the paragraphs on the Botanical Garden:

"You may be surprised to learn that there is a staff doctor who keeps the plants well, studies their diseases, and prescribes for them when they are sick. And that frequently an expedition is sent to some remote place, not to hunt lions and tigers, but to seek and bring back unknown specimens of all kinds of growing plant life. It is a very great honor to be permitted to accompany one of these expeditions."

Bugs

INSECT ALLIES. Eleanor King and Wellmer Pessels. 45 pages, illustrated. Harper, New York, 1938. $1.25.

The parent who has youngsters for whom he can buy good books is fortunate if Bobby and Jane demand Insect Allies. And Bobby and Jane will be lucky if they get a glimpse of the book before Dad has turned the last page and re-inspected all of the photographs. A large part of the book (which can be read within an hour) is devoted to the story of how governments are fighting crop-destroying insects with other insects which prey upon them and kill them. Entomology through these pages becomes a new type of career, on which any alert boy or girl can start right now in his own backyard, paving the way for a promising future, in which young people are needed "to study the scheme of nature and help work out plans for making nature's system of balances work *for* us instead of *against* us."

Ohio

WILD FLOWERS OF OHIO. Harold L. Madison. 190 pages, illustrated; index and glossary. Museum of Natural History, Cleveland, Ohio, 1938. $1.50.

Eight hundred twenty-five wild flowers of Ohio are described in three lines each and illustrated on the opposite page with cuts little more than one inch square. But for all this brevity, the descriptions and the pictures, each of which is clearly labeled with name and number, are amazingly clear. Common and botanical names are given for each flower, and many of the genera and families are described. The book fits handily into a small coat pocket.

Verses

MORE GREEN FINGERS. Reginald Arkell. 96 pages, illustrated. Dodd-Mead, New York, 1938. $1.75

Mr. Arkell likes to versify about a gardener's life. This is his second volume, the first one being called just "Green Fingers." "Compensation" is the title of one of his poems:

A gardener's life
  Is full of sweets and sours;
He gets the sunshine
  When he needs the showers.
But, don't forget
  He's always growing flowers.

Flowers and Honey

BEES IN THE GARDEN AND HONEY IN THE LARDER. Mary Louise Coleman. 131 pages, illustrated. Doubleday-Doran, New York, 1939. $1.75.

A rare little book is Mrs. Coleman's narrative of her experiences with bees. It is remarkable in that, although an intimate sort of story, it gives enough practical information to enable anyone to cultivate bees successfully and as a result to have a finer garden, by following the experiences of the author through the year.

CAROL H. WOODWARD.

Current Literature At a Glance*

By Virgene Kavanagh

Mushrooms. If you insist on picking your own mushrooms, you will be interested in "Common Edible and Poisonous Mushrooms of Southeastern Michigan" by Alexander H. Smith, published in Bulletin 14 of the Cranbrook Institute of Science, December 1938.

Fire. The United States Forest Service Library has published a bibliography on the effects of fire on forests. A very brief description of the titles is included.

Without Soil. If you want to eat fresh tomatoes from your own window box, the bulletin by Drs. Hoagland and Arnon will give you accurate information on many phases of their culture in water, including how to measure the chemicals with spoons and buckets instead of weighing them.—Circular 347, University of California, Berkeley. December 1938.

Lloydia. Issued as a quarterly journal of biological science, *Lloydia* appeared as a single, four-number volume in December 1938. It is published by the Lloyd Library of Natural History, Cincinnati, Ohio. Theodor Just and John Hoskins are the editors. Volume I is chiefly taxonomic.

National Parks. "What Are National Parks?" is a booklet issued by the American Planning and Civic Association as a supplement to *Planning and Civic Comment*, to point out the value and beauty of our 74 national parks created since 1906 and to urge the protection offered by the park for other areas which might well belong to the people as a whole instead of being subjected to private exploitation or to destruction. *Planning and Civic Comment* is a useful periodical for anyone interested in public beauty.

Colonial Gardens. V. R. Ludgate, Regional Landscape Architect for the Department of the Interior, writes briefly on the gardens of the early American colonists in the January number of *The Regional Review*, accompanying his notes with drawings of the types of enclosures used at different periods for gardens, fields, and properties.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Some Forthcoming Horticultural Features of this Journal in 1939:

Propagation of Waterlilies
Roses—Practical Information by a Group of Experts
Tuberous Begonias and How to Grow Them

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Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

The classes of membership and types of benefaction are as follows:

Annual Member	annual fee	$ 10
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Garden Club Affiliation	annual fee for club	25
Fellowship Member	annual fee	100
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Fellow for Life	single contribution	1,000
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Contributions to the Garden may be deducted from taxable incomes. The following is a legally approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————————.

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All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

May, 1939

THE GRACEFUL PALOVERDE ENTWINED AMONG THE SAHUARO GROWTH IN SAHUARO NATIONAL MONUMENT, ARIZONA
Cover Photograph by Martha Prentice Strong

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NEW FRIENDS FOR THE GARDEN

Through the World's Fair many thousands, probably hundreds of thousands, of people will be making their first acquaintance with The New York Botanical Garden. The waterlily pools in "Gardens on Parade" will represent to them the flower displays which may be seen here indoors and out at every season. The activated "krubi" (*Amorphophallus titanum*), with the photographs which frame the demonstration, will represent such activities as horticulture, science, exploration, education, and displays for the public's pleasure and information.

With new friends being made for the Garden, this is the ideal time for the old friends—members, Journal subscribers, and others—to play a part which many have heretofore overlooked: that of telling others about The New York Botanical Garden, what it stands for, what it does, how it serves scientists, students, gardeners, other institutions, and how its work affects the citizen and the visitor.

President Joseph R Swan exhorted the student gardeners at their graduation last month by saying: "When you go out into the world, *spread the gospel of the Garden*. Bring to the people a new appreciation of the place where you have received your professional training."

Everyone who is familiar with the institution can also perform a useful service both to the Garden and to their friends, by letting people know about the horticultural displays, inviting them to the museum and library, and informing them of the Garden's role in the progress of science, education, and public service.

BOTANICA

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Botanical Garden Represented In Two Exhibits At World's Fair

WATERLILIES which have been planted in three outdoor pools facing one of the entrances of the horticultural exhibit "Gardens on Parade" at the New York World's Fair, comprises one of two attractions at which The New York Botanical Garden will be represented to hundreds of thousands of people during the coming months in what used to be Flushing Meadows.

The second exhibit is an activated, life-sized model of the "krubi" (*Amorphophallus titanum*) which bloomed for the first time in the western hemisphere two years ago at the Botanical Garden. This exhibit, which is housed in the New York City building, is provided by the City of New York. It is accompanied by a series of photographs showing several stages in the development of the gigantic inflorescence and by another group of enlarged photographs depicting some of the Botanical Garden's functions in the public interest—horticultural displays, botanical research, reference work in the library, and exploration for plants.

The waterlilies, of which 28 hardy varieties have been planted in the three pools, surrounded by a narrow border of tulips for an early display, are expected to come into bloom about the middle of June. Around the end of July these hardy sorts will be replaced with choice tropical varieties, selected, like the hardy ones, from those which the Garden has previously grown for display in the two outdoor pools in the conservatory court. The usual displays of hardy and tender varieties will be continued all summer at the Garden. At the Fair, other tropical flowering aquatics will be shown during the latter part of the summer while the tender waterlilies are in flower.

"Gardens on Parade," is being presented at the Fair under the management of Hortus, Incorporated, a non-profit organization of which Mrs.

AY 13 1939

Harold I. Pratt, a member of the Botanical Garden's Board of Managers, is president and Dr. William J. Robbins is one of the vice-presidents. It includes 50 horticultural exhibits and will offer a continuous series of competitions in flower arrangement and plant exhibition.

Photograph by Donald U. Beck

Sunrise, *one of the largest of the hardy waterlilies, is one of the 28 varieties which will be blooming in the Botanical Garden's pools in "Gardens on Parade" this summer at the New York World's Fair. It is a recently developed yellow variety.*

Rose Conference June 6-7

The Rose Conference of which a preliminary announcement was made in last month's Journal will take place at The New York Botanical Garden June 6 and 7. The two-day program will include addresses on rose history, development, classification, recommended varieties, and other topics, besides a clinic on culture and diseases and insect pests. The conference will be open only to members of The New York Botanical Garden and to other persons by special invitation. The program, which is to be featured by dedication of a bronze plaque honoring Mr. L. C. Bobbink of Bobbink & Atkins, is announced on page 116.

Waterlilies—Their Culture And Propagation

With a Selection of Choice Varieties of Both Hardy and Tropical Sorts

By George H. Pring,
Superintendent of the Missouri Botanical Garden

EVEN the beginner in gardening, armed with the fundamentals, should have success with a waterlily pool, for the culture of the plants is relatively simple.

Waterlilies, both hardy and tropical, are rank feeders, and need large quantities of cow manure to produce good-sized flowers. This fertilizer may be spaded directly into the pool's bottom, if you use the open soil for your "lily bed"; or placed at the bottom of the boxes, if you prefer to grow them that way.

Pest Control

Before setting the waterlilies in the pool, the water should be left standing for some time, and efforts should be made to control the algal growth which is such a pest while the plants are still small. If your pool is large and has no fish, you can fill a little cheesecloth bag with copper sulphate, suspend it from the end of a stick, and drag it slowly along the edge of the pool until the water turns blue. After a day or two, you can set out your waterlilies, but if you are putting in a stock of fish, don't turn them loose in the treated water for a week.

If your pool is small or if it is already stocked with fish, a safer method of control is the use of permanganate of potash. Put some of this chemical in a jar filled with water. Stir it about a bit, and let it stand until the water has absorbed all it can take up, and there is still a slight residue in the bottom of the container. This system gives you a saturated solution of permanganate of potash, and this mixture is what you will use in controlling the algae. Approximately one teaspoon of the solution is added for each gallon of water in your pool, and this may be done not only before the waterlilies are planted but at different times during the growing season if necessary. Only the youngest of baby fish will suffer any ill effects, while the older fish don't seem to mind it at all. The copper sulphate has a more lasting effect, but is really too toxic for safe use by the amateur gardener, and cannot be applied during the growing season without fatal results to the fish.

In choosing methods of insect control during the summer, it is again wise to consider the fish before spraying. Wherever possible, resort to hand-picking for large pests like the larva of the delta moth, *Hydrocampa proprialis*, and use forceful water sprays for aphis, rather than risk killing

those invaluable little mosquito-eaters who will find arsenic or nicotine disastrous. Waterlilies have so few pests and diseases that you can afford to be charitable to the fish . . . and you'd miss the fish a great deal more than you would a few leaves from your lilies.

Setting Out Plants

Hardy waterlilies may be set out as soon as you can get into the pools. Their only care is plenty of cow manure, and a thorough division every three or four years to prevent overcrowding. They grow much like the common iris, and may be left out-of-doors with a foot or so of water above them, or covered with leaves and straw; or brought indoors in their boxes and wrapped in damp burlap all winter.

Tropical waterlilies are another thing altogether. Their winter care is so difficult from an amateur's standpoint that it is much simpler to buy your stock fresh each spring. In any case, they cannot be planted outside until the temperature of the water stays above 70° F. or they will go to sleep . and may stay that way. In the Middle West, we can usually set out our waterlilies by the middle of May, but in the East and the Great Lakes region, the first of June is more likely to provide a safe date.

Each plant needs at least one bushel of very rich sod soil, and about six feet of growing space on the water's surface, so don't crowd them. About fifty percent of your waterlily's beauty will be lost if it cannot spread its leaves to make an open pattern of foliage and water . . . and you will not get nearly as much bloom.

A Lesson in Propagation

The propagation of tropical waterlilies involves the use of an easy trick, which demands only a little ingenuity and practice and some heated tanks of water in full sun over the winter. The large tubers which produce the current growth are practically impossible to store . . but most of these large tubers will have formed a propagating tuber at their base by the time summer is over. When you dig the plants after the first frost, these small, nut-shaped tubers should be removed and stored in slightly moist sand, in closed containers, until early spring, when the sunlight begins to grow stronger.

Then pot them in sandy soil, with the tuber very deep in the pot to induce a long radical growth. Place the pots in water above 70° F., in a sunny window, and the young leaves will appear in about two weeks. Now comes the interesting part. As soon as the floating leaves are developed, locate the radicle, which is a stem-like growth connecting the young plant to the tuber. With thumb and forefinger, follow this growth down to the tuber, and carefully pinch it off just above the tuber, removing the young plant with its attached roots, but leaving the propagating tuber in its pot.

Photograph by Donald U. Beck

St. Louis is said to be the only yellow variety known among the tropical waterlilies. It is expected to be among the varieties to be shown by The New York Botanical Garden in "Gardens on Parade" at the World's Fair later in the summer.

Pot up the young plant immediately, to prevent its drying out, and place it to grow in the far end of the same heated tank in which you are raising your propagating stock. In another two weeks or so, the propagating tuber will again send up a new plant, which can be removed and potted in the same fashion . . . and this process may be repeated two or three times before the tuber should be allowed to keep its last plant. Your tank will then be filled with infant waterlilies to carry on next season's bloom.

The Viviparous Habit

Some few of the tropical waterlilies have a very obliging habit of forming baby plants in their leaf sinuses during the summer. These waterlilies are known as *viviparous*, and their offspring should be removed with attached roots and potted up just as the other young waterlilies are handled over the winter. Two good viviparous lilies are the varieties ***Panama Pacific*** and ***August Koch***, in different shades of blue. They are worth having both for their beauty and their ease of culture.

Tropical Varieties Recommended

Among other good tropical waterlilies are ***General Pershing*** and ***Castaliaflora,*** both pink, while ***Henry Shaw*** and ***Jupiter*** are two fine blues. ***Mrs. G. H. Pring*** is still the best white in the day-blooming group, while the only yellow is ***St. Louis,*** that amazing offspring of the "Lost Yellow Lily of Africa," *N. Burtii.* ***Mrs. Edwards Whitaker*** is an interesting lavender-blue, which develops a white-and-blue combination the third day.

In addition to the day-blooming tropical waterlilies, there is a large class of tropicals blooming at night. They do much to make the garden attractive on summer evenings, since they open about sunset, when the heat of the day is over. Leading this list is a handsome white waterlily which would undoubtedly have proved more popular if it had not been listed as a night-bloomer. This is the variety ***Missouri***, with the broad, lotus-like petals and pineapple fragrance typical of these night blooming members of the genus *Nymphaea.* Quite untypical, however, is its extremely early opening and late closing, which keeps it in bloom most of the morning and brings it out again late in the afternoon. Considered by some to be the handsomest waterlily in commerce, ***Missouri*** should be included in every pool.

Other good night-bloomers are two very dark pinks, ***H. C. Haarstick*** and ***Frank Trelease,*** while ***Mrs. George Hitchcock*** and ***Emily Grant Hutchings*** are two fine pinks. Occasionally a night-blooming waterlily will revert to a different shade from the original type, so don't blame your waterlily grower if this happens. However, they are all lovely things . . . and ***Missouri,*** furthermore, has never been known to change color from its gardenia white.

Good Hardy Varieties

Among the hardies are innumerable good ones. The new ***Sunrise*** is a splendid yellow, almost as large as some of the tropicals, while the white variety ***Gladstone*** is very perfect in form. Another fine white is ***Gonnere,*** while the dark pink of ***James Brydon*** and the orange of ***Comanche*** and ***Solfatare*** are excellent colors.

Even if you have a very tiny pool, no bigger than a half-barrel, you can still have waterlilies. Two charming pigmies are *N. helvola* in yellow, and *N. tetragona* in white. Obviously any water area would suggest the use of waterlilies, provided always that it gets enough sun and has sufficient water depth. The hardy types are easiest to grow and have the more brilliant colors, while the aristocratic tropicals are gigantic in size and come in lovely pastel shades. Nothing could be more attractive in the heat of summer than the fragrance and color of a waterlily pool, reflecting the blue sky between the leaves, and adding an unforgettable depth and beauty to your garden.

The Yam-Bean As a Source Of Food In China

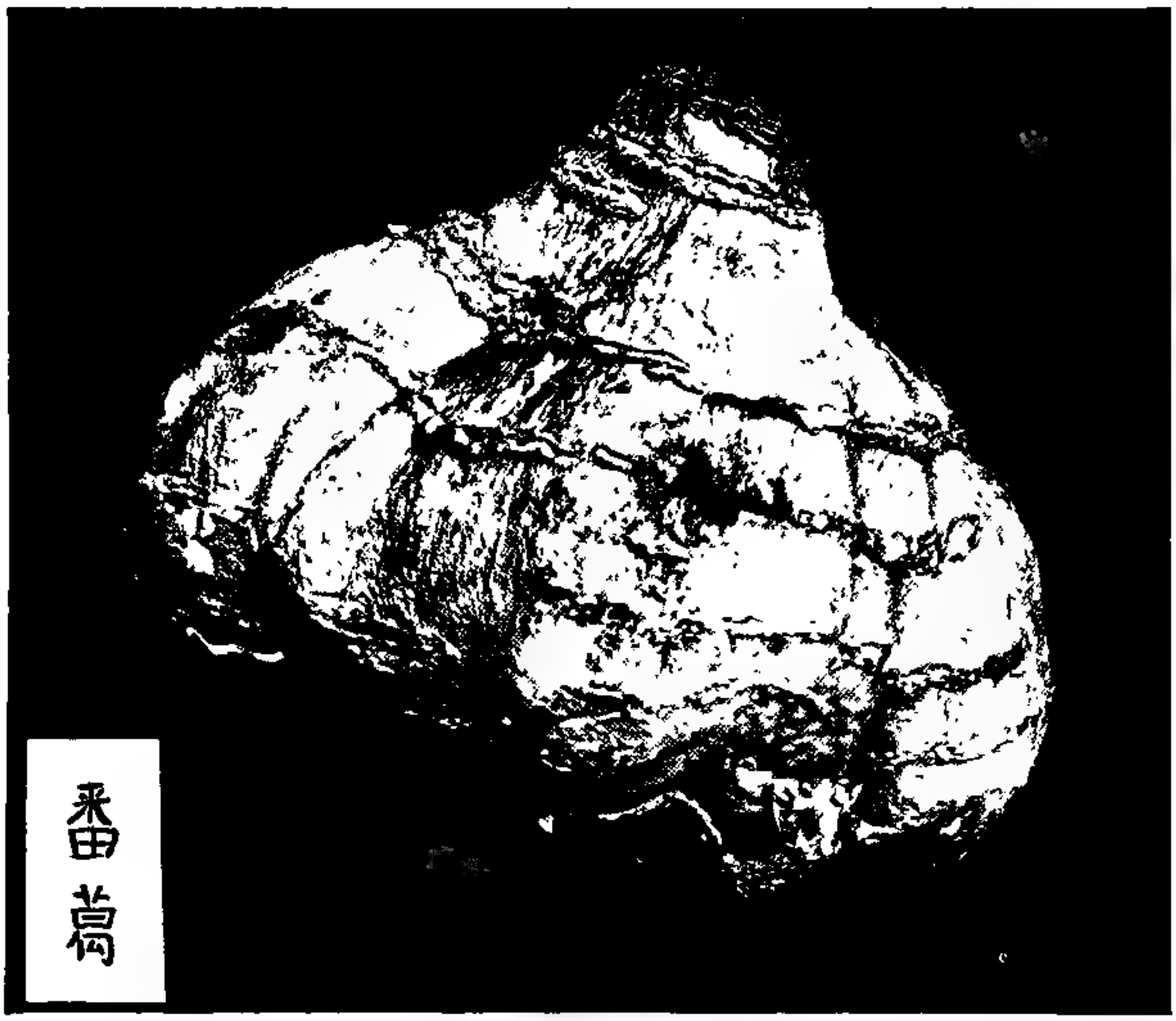
By W. W. Porterfield

(No. 6 of a series on Chinese Vegetable Foods in New York)

THE yam-bean vine has achieved a place among Chinese vegetable foods because of the superior quality of starch which is yielded by its tuberous roots.

Fan-ko is the name by which the native Chinese distinguish this useful plant. Botanists know it today as *Pachyrhizus erosus* (L.) Urb. It was formerly called *P angulatus* Rich.

The yam-bean has a tropical distribution around the world. De Candolle[1] reported it from the Moluccas, India and Mauritius; Dr. Trimen[2] from



The tuber of Pachyrhizus erosus, three fourths natural size, with the character for its Chinese name, Fan-ko. A superior quality of edible starch is derived from this yam-bean tuber.

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[1] De Candolle, Pyramo. Prodromus Systematis Naturalis Regni Vegetabilis **2**: 402. 1825.

[2] Dr. Trimen in Kew Bulletin **25**: 121. 1889.

Java and Ceylon; Henry[3] from Canton, China; Bentham[4] from Brazil; and Cook and Collins[5] from Porto Rico. But the land of its origin is obscure. Henry is of the opinion that it originated somewhere in America; Bentham said that probably Central America was its native home.

The angular dentate leaflets give this species the two specific names by which it has been known and distinguish it from its West Indian relative, *P tuberosus* (Lam.) Spreng., whose leaflets are entire. The leguminous character of the plant is evident in its papilionaceous flowers and flat pods, which are shorter and more hairy on *P erosus* than on *P tuberosus*. Dr. Trimen emphasizes this latter difference by the tale of the coolies who said they could not eat the pods of *P erosus* in their curries without causing diarrhoea, which was no doubt due to the hairs. They had been accustomed to eating the pods of *P tuberosus*, which had been introduced into Ceylon a few years earlier and which had proved superior to ordinary French beans because they were stringless and nearly smooth.

The fleshy root of the yam-bean is nearly globular in shape, though broader than long, and it varies from 1 to 2 decimeters in diameter. In shape it is somewhat lobed, as the figure shows. The flesh is of firm consistency and is sweet to the taste, but is tough, a disadvantage in accepting it as a desirable vegetable for American palates. Generally, it is the young roots which are eaten, while the older ones are principally used as a source of starch. In some countries, while the yam-bean tubers are not used as a principal source of food, the people depend upon them to carry them over times of scarcity when the usual crops fail.

An analysis of yam-bean tubers shows that they have an abundance of nutritive substance. In water-free material the following proportions are found: 9.8 percent protein, 6.5 percent albuminoids, 38.5 percent starch, 16.9 percent cane sugar, .8 percent fat, 6.5 percent crude fiber, and 3.6 percent ash. The starch is present in nearly spherical grains, appearing singly or in compound form, and, according to Blasdale[6], there is no indication of their occurring in a layer-like structure. This absence of stratification of the grains is a diagnostic character by which the starch of the yam-bean can be identified.

No medical uses are known for this plant. The seeds, however, contain a small amount of poisonous resin which is found to be a very active fish poison. In *P tuberosus* the poison exists in greater amounts in the seeds but is present also in the tubers.

From the twining stem the natives of Fiji derive a tough fiber which is used in making fishing nets. Other than this no special uses for the upper part of the plant are known, and no particular ornamental value is attributed to the vine.

[3] Henry, A. Notes on Economic Botany of China. 57-59. Shanghai. 1893

[4] Bentham, G. in Mauritius, Flora Brasiliensis **15** (Papilionaceae): 199. 1859-62.

[5] Cook, O. F., and Collins, G. N. Economic Plants of Porto Rico. Contrib. from U. S. Nat. Herb. **8** (2): 208. 1903.

[6] Blasdale, Walter C. A description of some Chinese vegetable food materials. U. S. D. A., O. E. S., Bull. 68; 23-25. 1899.

Cacti in the Northeast

By Martha Prentice Strong

The story of an odyssey by air in search of cacti in the Southwest, and how these desert plants were later cultivated at a Long Island home.

A VIVID memory of my childhood was the beauty of a great cactus flower. In the terraced garden of our home on Brooklyn Heights, covering the western wall of the camellia hothouse, the thorny green joints of a cactus plant were trained. The night the magnificent flowers of this "Reina de la Noche" bloomed, our neighborhood was *en fête*. It was a rare sight to watch the unfolding of the greenish sepals and satiny white petals, until the myriad golden anthers were revealed in their radiant beauty, to the glorious climax of the perfumed, expanded flowers; then, as gradually, one watched the passing of this "Queen of the Night."

* * *

As it was necessary for me to go to Arizona, April 29, 1936, at 8:30 P.M. I flew from the Newark Airport. Early the following morning, flying

Photograph by courtesy of William Hertrich

Hylocereus undatus, the "Reina de la Noche" which Mrs. Strong saw blooming as a child at her home in Brooklyn and with which she again became acquainted more than 70 years later at the Huntington Botanic Garden.

The satiny yellow flower of the native cactus found among the Long Island dunes.

over the Mississippi Valley, glimpses of cultivated farms, and submerged fields were soon obscured by fog. Rising, we flew in an ocean of blue atmosphere over glistening cumulus clouds, and looked down through occasional azure rifts at the tops of green forests 8,000 feet below . . . then over deserts and the Rocky Mountains, arriving at the mountain-fringed desert of Tucson 2,213 miles from the airport, in 22 hours.

Living for a year in this desert, the study of the cacti became of absorbing interest. At the University of Arizona, I received an excellent text book "Arizona Cacti". With camera and text book, I photographed many species; spent hours at the Carnegie Library pouring over "Cactaceae" by Britton & Rose; studied the available literature of the Sahuaro, Opuntia, Bisnaga and other cactus groups; learned of their wonderful evolution and adaptation through centuries, to their arid desert environment; unique characteristics; varied forms; and delighted in their exquisite flowers.

With the Garden Club of Tucson and the Natural History Society, I made field trips to the Sahuaro Monument. With a letter of introduction from the late Dr. Marshall A. Howe, former Director of The New York Botanical Garden, I motored 240 miles to visit the Boyce-Thompson Southwestern Arboretum, devoted to the growth of sub-arid climates, and was kindly received by Mr. Francis Gibson, the director; and Mr. Jack Whitehead assisted me in making many photographs of the cacti growing there in beautiful natural surroundings.

As the Huntington Garden of San Marino has the most comprehensive representation of xerophytes in the world today, growing out-of-doors, that was my Mecca.

April 5, 1937, at dawn, I started on another lap of my air odyssey. The moon in its last quarter was shining in mid-heaven in a cloudless sky. Flying over the Tucson Mountains, the sun rose over the Rincons, casting long blue-black shadows over the desert; the giant sahuaros beneath us were mere exclamation points; to the left, five mountain ranges came into view as we ascended.

Flying over mountains tipped with jagged, fantastic formations, we saw the Colorado River, later the azure-blue Salton Sea in the white desert, and then through the San Gorgonio Pass of the Sierra Nevada Mountains with their glistening white snow peaks towering 1,200 feet above us on either side—we flew at an altitude of 1,000 feet between them. Behold, the arid desert was a memory! Before us, chaparral-covered green mountains, green fields, groves of date palms, oranges, almonds, figs, and my Mecca, San Marino!

Mr. William Hertrich, Director of the Garden, kindly permitted me in the morning when the Garden was not opened to the public, to make photographs of this unique desert plant collection. From him I learned that the wondrous cactus of my childhood memory was one of the most beautiful species of the night-blooming cereus, *Hylocereus undatus*.

Returning to my Long Island summer home in East Hampton, three minutes' walk from the Atlantic Ocean, I brought with me:

Ariocarpus fissuratus
Deamia testudo
Lemaireocerus Thurberi
Cephalocereus senilis
Opuntia rufida
Mammillaria MacDougallii
Cereus peruvianus
Epithelantha micromeris
Lophophora Williamsii
Thelocactus bicolor
Opuntia Covillei
Ferocactus nobilis
Astrophytum ornatum
Mammillaria prolifera

Peniocereus Greggii

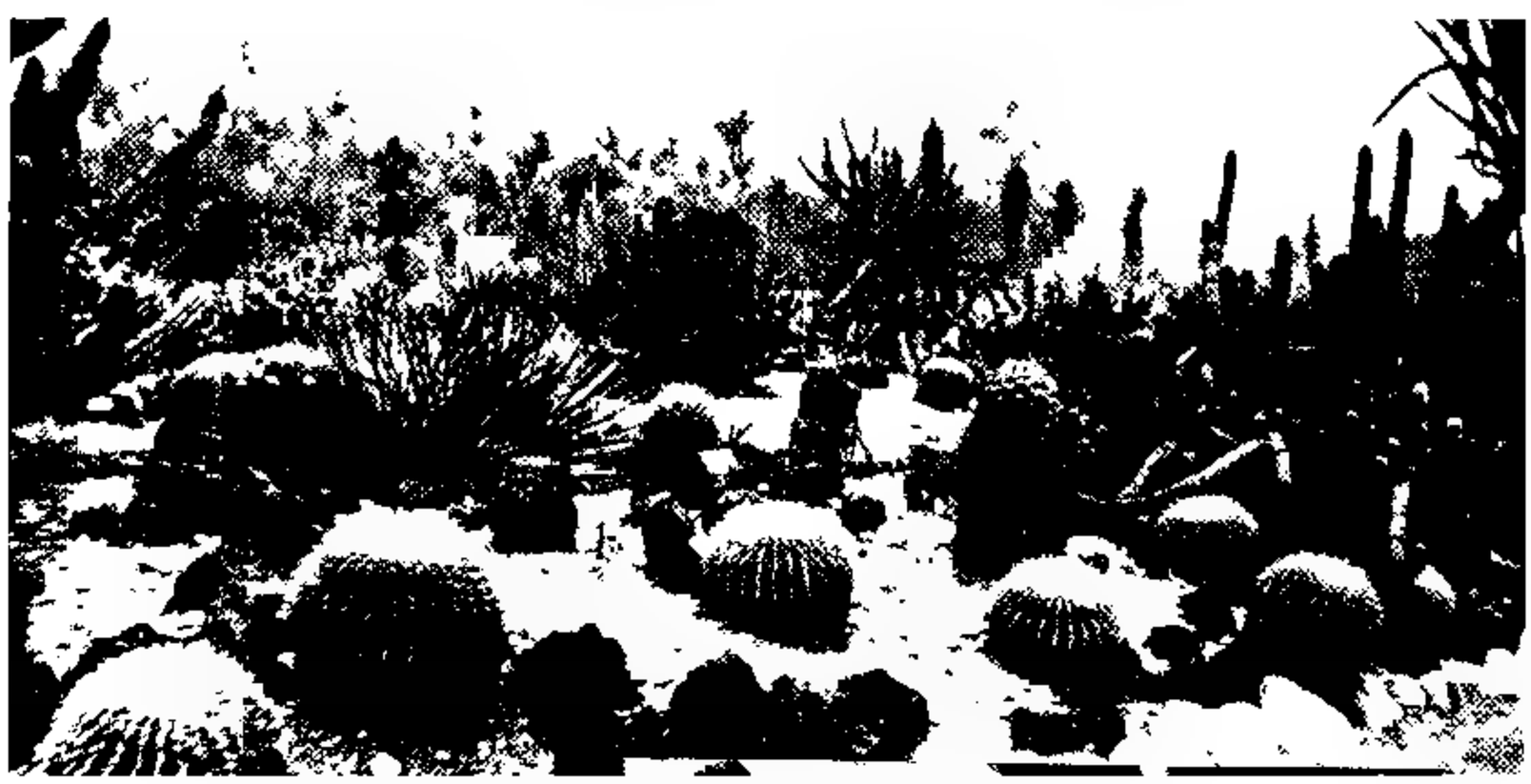
To these were added, through the kindness of Mrs. Jerome W. Coombs, member of our Advisory Council of The New York Botanical Garden, succulents she had brought from South Africa:

*Mesembryanthemum**	*Zeyheri*	*Crassula arborescens*
"	*coccineum*	*Gasteria subcarinata*
"	*aureum*	*Senecio aizoides*
Haworthia	*rugosa*	*Kalanchoë tubiflora*
"	*cuspidata*	*Adromischus clavifolius*
"	*denticulata*	

* These species are now classed by botanists under *Lampranthus*.

CACTI UNDER CULTIVATION IN THE WEST AND SOUTHWEST

1. *Echinocereus Engelmannii, the yellow-spined hedgehog cactus.*
2. *Opuntia fulgida, a cholla with small rose-purple flowers.*
3. *Ferocactus Wishzeni, the candy-barrel or fish-hook cactus, growing nearly seven feet tall.*
4. *Cereus peruvianus at the Huntington Botanic Garden.*
5. *A young three-headed specimen of Ferocactus Wislizeni.*
6. *Cereus alacriportanus.*
7. *Opuntia linguiformis, cow's-tongue cactus, with yellow flowers.*
8. *A group of cacti at the Huntington Botanic Garden consisting chiefly of Echinocactus Grusonii and Ferocactus nobilis.*
9. *One of the many species of Opuntia in a garden.*



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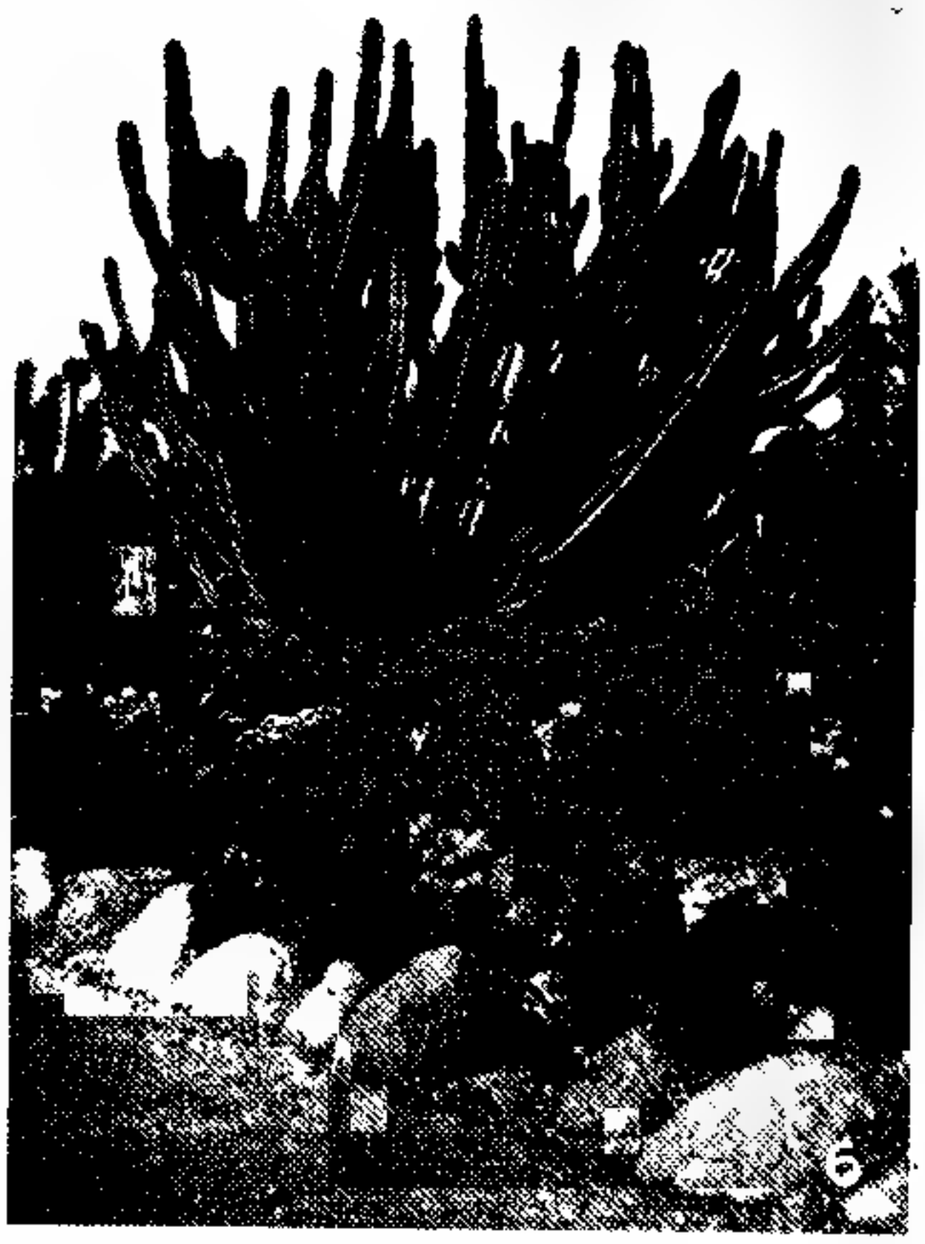
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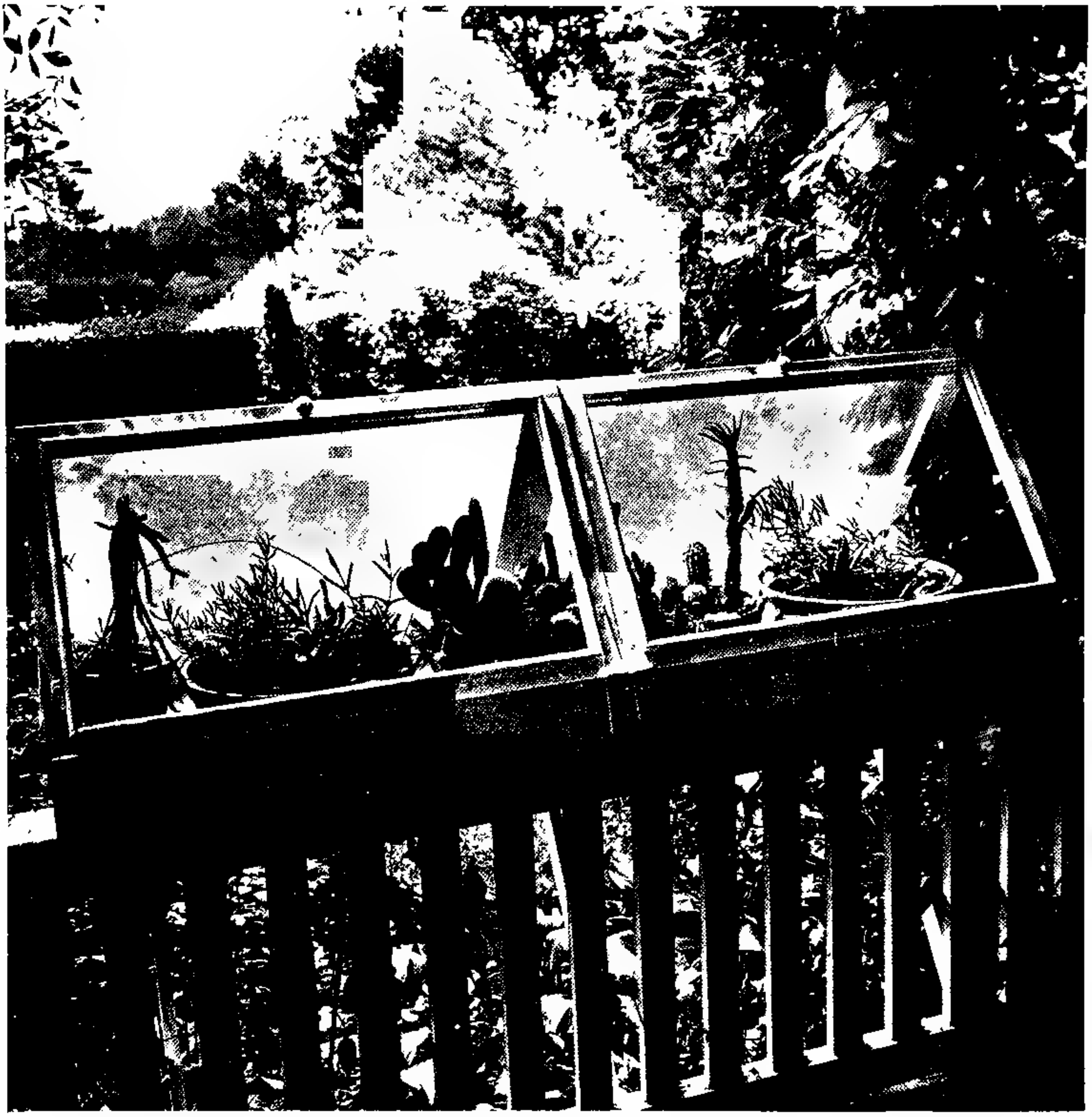
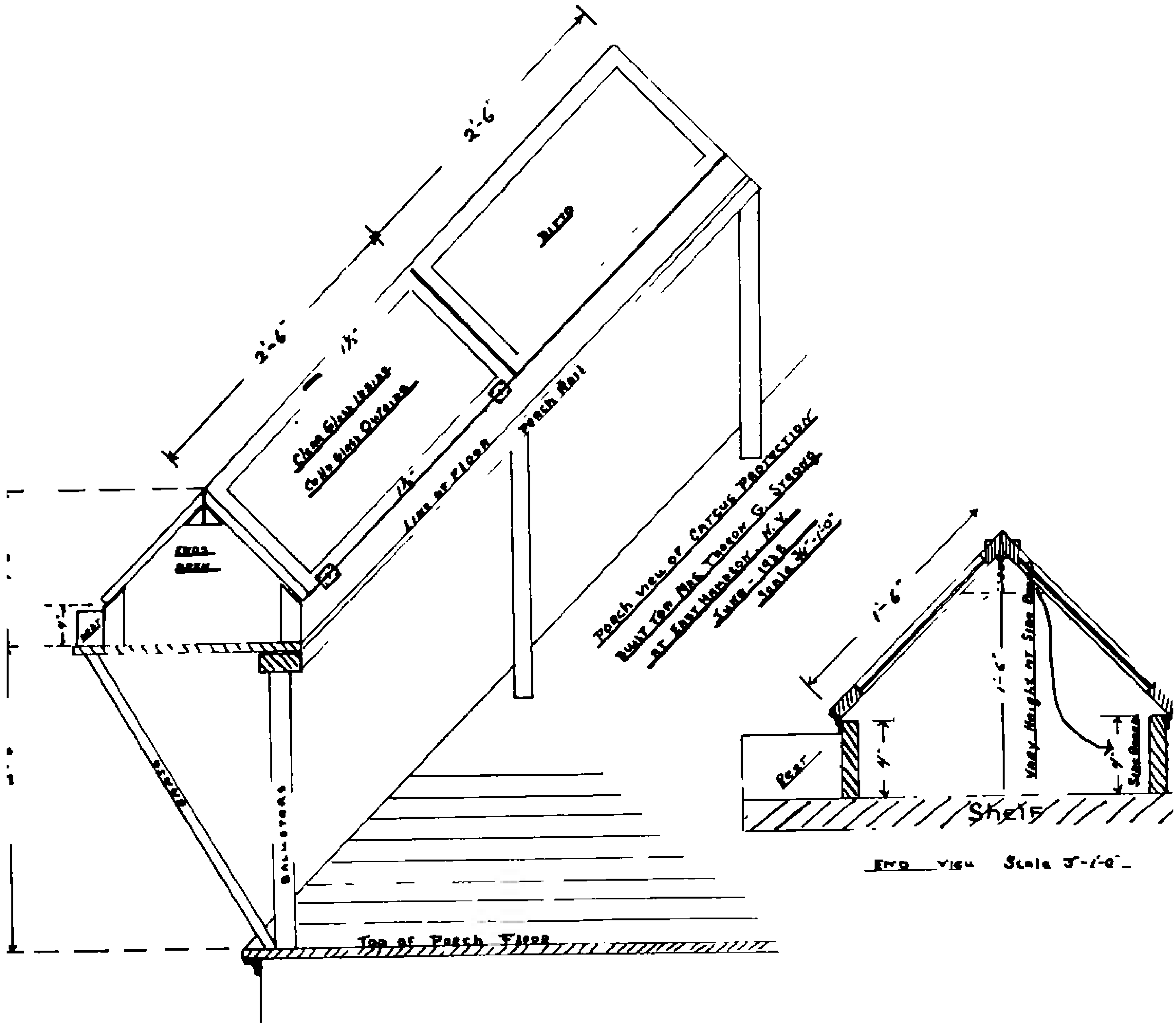


The glass frame on the porch of her home at East Hampton in which Mrs. Strong has cultivated the cacti which she brought back from her southwestern trip. Exposed to full sun on the south and protected from wind and rain, these desert plants here have an ideal situation for their growth.

I established a desert landscape having a southern exposure on the piazza. As the cacti and succulents must have full sunlight, plenty of air, and protection from rain, I arranged a glass frame of simple construction, easy adjustment, and open at both ends for the circulation of air.

To cultivate the single cactus species native in the East, *Opuntia compressa,* I made a dune rock garden. In this were planted many of the



Plan of the frame which Mrs. Strong devised for the outdoor culture of her cacti.

cactus plants from a near-by dune. There in our hot summer sun they have grown much larger than on the dunes from which they were transplanted, and bring forth profusely their exquisite yellow satiny flowers.

Though thousands of miles away from their desert home, where the giant sahuaro, the antlered, tree-like opuntias and the prickly pears, the bisnagas, and other cactus forms make unique and never-to-be forgotten scenes, I may now delight in my realistic cactus landscape in miniature—see our beautiful native *Opuntia compressa* bloom, and recall the beauty of a childhood memory, the wonderful "Reina de la Noche," *Hylocereus undatus.*

Preliminary Program

OF THE

ROSE CONFERENCE

AT

The New York Botanical Garden

June 6 and 7, 1939

TUESDAY, JUNE 6

MORNING 10-12.30

Address of Welcome — Dr. William J. Robbins, Director, The New York Botanical Garden.

History of the Rose — Mr. Richardson Wright, Chairman, Board of Directors, The Horticultural Society of New York. 20 min.

Public Rose Gardens and Highway Beautification — Dr. J. Horace McFarland, Past President, The American Rose Society. Editor, *The American Rose Annual.* 20 min.

Soilless Rose Culture — Dr. H. M. Biekart, Associate Ornamental Horticulturist, New Jersey Agricultural Experiment Station. 15 min.

Contributions of the United States Department of Agriculture to Rose Culture
Dr. E. C. Auchter, Chief, Bureau of Plant Industry, Washington, D. C. 20 min.

My Favorite Rose

Mrs. Charles Doscher, representing the Federated Garden Clubs of New York State. 5 min.

Mrs. Robert C. Hill, representing the City Gardens Club. 5 min.

Mrs. Francis King, representing The Garden Club of America. 5 min.

Mrs. H. Edward Manville, representing the International Garden Club. 5 min.

Mrs. George W. Perkins, representing the Advisory Council of The New York Botanical Garden. 5 min.

A representative of the Woman's Auxiliary of the Brooklyn Botanic Garden. 5 min.

LUNCH 12:30

AFTERNOON 2 - 4:30

Greenhouse Roses — Mr. Charles Totty, Past President, The Society of American Florists and Ornamental Horticulturists. 20 min.

Roses for City Parks — Mr Allyn R. Jennings, General Superintendent of Parks, New York City. 15 min.

Old Roses — Mrs. Frederick L. Keays, Author, Great Neck, N. Y. 20 min.

Dedication of Bronze Plaque in the Rose Garden in Honor of Mr. L. C. Bobbink
Presiding, Mr. Joseph R. Swan, President, Board of Managers of The New York Botanical Garden.

Inspection of Rose Garden — Led by Messrs. Everett, Dodge, and McKenna.

WEDNESDAY, JUNE 7

MORNING 10-12:30

Importance of Soil Preparation for Roses — Mr. T. H. Everett, Horticulturist, The New York Botanical Garden. 15 min.

Experiments on Roses — Dr. P. W. Zimmerman, Physiologist, Boyce Thompson Institute for Plant Research. 20 min.

Use of Roses in Floral Decoration **(with demonstration)**
Mr. Max Schling, Florist, New York City. 20 min.

Books for the Rose Grower — Miss Elizabeth C. Hall, Librarian, The New York Botanical Garden. 15 min.

Roses for the Home Garden	Mr. Arthur Herrington, Secretary and Manager, International Flower Show. 20 min.
Species Roses for the Garden	Mr. C. R. McGinnes, Reading, Pa. 20 min.
Design in the Rose Garden	Annette Hoyt Flanders, Landscape Architect. 15 min.

LUNCH 12:30

AFTERNOON 2 - 4:30

Care of the Rose Garden through the Year	Mr. George Gillies, Head Gardener, Marshall Field Estate, Huntington, Long Island. 20 min.
The Rose Midge and Its Control	Dr. C. A. Weigel, Entomologist, United States Department of Agriculture. 15 min.

Demonstration of Equipment for Control of Diseases and Insect Pests of Roses.

The demonstration will be followed by an informal clinic on the diseases, pests, and culture of roses. Home gardeners and others are invited to bring their personal problems to the clinic for individual attention.

Dr. B. O. Dodge, Plant Pathologist, The New York Botanical Garden

Dr. C. C. Hamilton, Entomologist, New Jersey Agricultural Experiment Station

Dr. Louis M. Massey, Professor of Plant Pathology, Cornell University

Mr. P. J. McKenna, Foreman Gardener, The New York Botanical Garden

Plants For Distribution To Garden Members

TWO choice varieties of herbaceous plants which are suitable for the rock garden or border will be available for distribution to members of The New York Botanical Garden during May. So long as the supply lasts, one young plant each of *Veronica spicata rosea* and *Achillea tomentosa* variety ***King Edward*** will be given out.

To obtain the plants, a member or representative of a member may call at Conservatory Range No. 2, near Allerton Avenue on the east side of the grounds, any week-day during May between 10 a.m. and 4 p.m. *No plants will be given without presentation of the membership card of The New York Botanical Garden.*

For members who wish the plants mailed to them, arrangements have been made with an outside agency to handle the wrapping and postage for 25 cents, sent to the Garden in advance. Plants will not, however, be mailed outside of the Japanese beetle barrier zone.

The Garden's original plant of *Achillea tomentosa* variety ***King Edward*** was acquired in 1935 from the garden of F. K. Bulley in northern England, and has been used in the rock garden and propagated here until there are now enough specimens to introduce into other gardens. Growing ten inches high, the plant sends up numerous stems, each of which bears a flat-topped corymb of lemon-yellow flowers. The fine fern-like leaves beneath are gray-tomentose. The odor is of camomile. This plant likes full sun and fair moisture but is fairly indifferent as to soil, seeming to do equally well in a limey or neutral medium. Its color and form make it associate well in rock garden or border with *Veronica Teucrium rupestris.* It usually blooms around May 27.

The other plant being offered, *Veronica spicata rosea,* grows slightly less than two feet high and has many erect stems bearing closely set spires of pink flowers around June 30. While there is a slightly bluish cast to the pink, it is not unpleasant as long as it is kept away from reds and lavenders

The rebuilding of the conservatories during the past two years with the consequent disarrangement and crowding of plant collections has made it impossible for the Garden to offer any plant novelties to its members for the past year and a half. More plants are now being propagated, however, for distribution to members at future dates.

Clarence Lewis Addresses Graduating Class Of Gardeners

CERTIFICATES were granted to fifteen men, most of whom have been serving as student gardeners, for the completion of the two-year science course of The New York Botanical Garden in exercises conducted at the Beekman Tower Hotel Monday evening, April 17. Out of this class, which is the sixth to graduate, eleven of the young men have been employed at the Garden, while the other four are professional gardeners working elsewhere.

The work of the past two years has covered the subjects of systematic botany, plant morphology, physiology, breeding, and pathology, economic botany, and ecology.

Clarence McK. Lewis, a member of the Garden's Board of Managers, addressed the students at their graduating exercises, offering them suggestions for their future careers as gardeners.

Opening with the definition given by the British horticulturist, W. J. C. Lawrence, that a gardener is *a man who under a wide variety of conditions can grow plants well,* Mr. Lewis pointed to additional requirements for a man who has a responsible job as gardener.

"Can you keep accounts?" he asked. "Can you make out a budget and keep within it? Can you handle correspondence, make estimates for planting jobs, and submit reports to your superior? If you have men under you, are you capable of handling the multiplicity of administrative duties which are required in such a post?

"Do you know how to exhibit plants well? Remember, exhibiting is a fine test of any gardener's skill.

"Ability to do these jobs is a necessity for a man who hopes to make a career of gardening, but the greatest attribute of all comes from experience."

In England, Mr. Lewis commented, gardeners may take examinations to keep abreast of developments in their profession.

In judging the desirability of a position or line of work, he pointed out that there is a special value in a job when it offers an opportunity to do work that will be interesting to the individual concerned and that in the end will yield a sense of definite accomplishment.

"When you gardeners start looking around for the work that suits you best for the making of a successful living, you will do well to consider," he said, "some of the less obvious possibilities." He then spoke briefly on opportunities in:

1. Private places.
2. Public parks.
3. Cemeteries.
4. Botanic gardens.
5. Government test gardens.
6. County agent posts (in counties where commercial growing under glass is important).
7. Nurseries.
8. Commercial work.

There is a multiplicity of jobs and opportunities in nurseries, Mr. Lewis pointed out, and the work of a propagator is an especially important one in this field.

Among commercial jobs, he continued, there are such possibilities as the raising of material for cut-flowers and pot-plants, the raising of plants for the seed industry, hybridization, growing of fruits and vegetables, for which the same sort of horticultural-scientific background is necessary as for the raising of ornamental garden plants, foreign work—either an apprenticeship or a job, and plant exploration. Men who have worked for a time in foreign countries, he noted, thereby gain a breadth of view and experience which often helps them to a greater success in later life.

Because of the present decline of large estates, Mr. Lewis discouraged the graduates from thinking too exclusively of this type of employment, and urged them rather to look to other fields, especially to nurseries and other commercial places, as types of work which may hold more lasting possibilities for professional success and personal satisfaction.

Giving examples of men whose names have become famous for their work in specific horticultural fields, Mr. Lewis cited particularly the great family of Veitch in England, commencing with John Veitch, born in Jedburgh, Scotland, in 1752, and continuing until today. The story of the Veitch nursery is incorpor-

ated in the interesting book "Hortus Veitchii," published in 1906. Mr. Lewis then told of the other men connected with the firm—such as William and Thomas Lobb and Charles Maries -whose names have also come down to posterity. He cited the work of the great French nursery family of Vilmorin, and mentioned also the plant exploration done by Robert Fortune, Reginald Farrer, George Forrest, and Kingdon Ward, as well as E. H. Wilson, who eventually came to America. He spoke of "Johnny Appleseed" (John Chapman) (1768-1847) whose volunteer work in the early nineteenth century was to distribute and plant seeds of fruit trees and grape vines in order that our migrating ancestors could have seedlings on which to graft the apples, peaches, and grapes they wanted to raise.

As an example of a gardener who became a famous architect, he mentioned "Capability" (Lancelot) Brown of early eighteenth century fame. He told the story of Thomas Blaikie, the Scottish gardener, who went to France and lived through all the exciting period of the French Revolution and the Empire, dying in his 89th year in 1838. Among other great gardens Blaikie laid out the Bagatelle garden in Paris. His story is given in "The Diary of a Scotch Gardener of the French Court at the End of the Eighteenth Century," published in New York in 1932.

The speaker also lauded the gardener Joseph Paxton—who was later made Sir Joseph—for his accomplishment in designing in 1851 the Crystal Palace at Sydenham, which cost some £1,500,000 to build. This magnificent structure had an area of about one million square feet. It was 1,608 feet long and 312 feet wide. Joseph Paxton was not only knighted for this outstanding service, but also served as a member of Parliament for Coventry until his death in 1865.

Among American plant explorers who began as gardeners, and whose chief interest remained in gardening, Mr. Lewis noted André Michaux and his son, François André Michaux, William Bartram, Constantine Rafinesque, and Friedrich Trangott Pursh. Trained as a gardener in the Royal Gardens of Dresden, Pursh for a time was gardener in charge of the Elgin Botanical Garden here in New York, which was on the site where Rockefeller Center now stands and which was, in a way, the historic precursor of our present New York Botanical Garden.

Other American plant explorers particularly mentioned were Henry W. Sargent of the Arnold Arboretum, Frank N. Meyers of the U. S. Department of Agriculture, and Wilson Popenoe, with his test garden at Tela, Honduras, his residence at Antigua, Guatemala, and his extensive and valuable work for the United States Government and now for the United Fruit Company.

Mention was also made of the interesting career of Dr. J. H Nicolas in plant introduction and breeding, first with the Conard Pyle Company and later, until his death, with Jackson & Perkins, and of John C. Bodger, whose back-yard business in 1885 has grown to a thousand acres under cultivation for the growing of garden seeds.

After his address Mr. Lewis spoke also of Andrew Jackson Downing of Newburgh, N. Y., who in his brief span of 37 years (1815-1852) no doubt exerted the greatest influence of anyone on American gardening and landscaping. He did not mention Dr. David Fairchild, he explained, because Dr. Fairchild could not be called a professional gardener either in his origins or in his subsequent interests. The other men of whom he spoke were fundamentally gardeners.

Joseph R. Swan, President of the New York Botanical Garden, who presented the certificates, first said to the graduates, "When a man knows what he wants, he has a much better chance than the man who merely 'wants a job'." He also asked the students, when they go elsewhere to work, to help make others acquainted with The New York Botanical Garden. "Spread the gospel of the Garden," he urged them. Then he awarded certificates to the following students:

John M. Bachmann, Adelard Bisaillon, Samuel Bridge, Lawrence Connolly, George McGregor, Donald J. Moss, Charles Pecora, Ralph Pinkus, Donald Samson, Ronald Townsend, and Wilbur Wright, all of The New York Botanical Garden; also to Lawrence Hadland, William Krogslund, Clyde Nellis, and Paul H. Jacoby, professional gardeners who are employed elsewhere.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Good News for Shady Gardens

GARDENING IN THE SHADE. H. K. Morse. 205 pages, illustrated, indexed. Scribner, New York, 1939. $3.

The question of what to plant in that shady place has long been a troublesome one for gardeners. The common attitude is well expressed by the author in this paragraph: "The shade spot in a sunny garden is the problem which faces most gardeners. They try their luck with sun lovers, hoping for miracles which just do not happen. The plants languish and die, or live such nostalgic lives, they were better dead. Finally the gardener, his patience exhausted, gives up, and leaves the shady spots—just bare."

With this book as a guide there can be no excuse for a continuance of bare places. Mrs. Morse has dealt with the problem in a very practical and pleasing manner, and just how to improve and prepare soils for different groups of plants is clearly set forth. Seasonal plant combinations for varying degrees of shade are given, and for situations all the way from the wild woodland to the city backyard even into the sunless window garden.

A classified and detailed list of some 500 shade-tolerant plants is given, which proves there is no lack of plant material from which to choose. This reviewer would like to specify *Euonymus radicans coloratus* as a ground-cover plant for that particularly tough place under trees, and to add *Akebia quinata* to the list of vines for a shady place. It is a good twiner for fences and arbors or to sprawl around rocks, and makes a good billowy ground cover.

The very good illustrations from photographs show pleasing combinations for various conditions and speak well for themselves and the planters.

This is a useful and timely book, that should do much to change unsightly barren spots into well furnished scenes of real beauty and interest.

HENRY E. DOWNER,
Vassar College.

Forestry in America

AN INTRODUCTION TO AMERICAN FORESTRY. Shirley W. Allen. 402 pages, illustrated and indexed. McGraw-Hill, New York, 1938. $3.50.

This text is one of a series of books planned by McGraw-Hill to cover the whole field of forestry. Under the able editorship of Professor Mulford of the University of California, this plan is well on its way to fulfillment.

Professor Allen's book must therefore be viewed primarily in the light of the purpose for which it was written,—a general text for classroom work. However, because of the popular style in which the subject matter is presented, and the coverage which is given to the whole field of forestry, this book is of value to the lay reader as well as to the student just beginning a study of forestry. It is from the former viewpoint that the present reviewer feels best qualified to comment.

There is always the danger in attempting to cover so large a field as that of forestry in one book that superficiality will creep in, and the coverage become so thin that depth is utterly lacking. Professor Allen has happily avoided this pitfall by stopping again and again in the broad sweep of the canvas he is painting, to give arresting details that stimulate the reader to peruse the subject further in more specific texts. This is a real test for an "introduction" to any subject.

Particularly to be commended are the chapter headings and chapter arrangement. Such intriguing titles as "What a Forest Is" or "What Forestry Is" are not achieved without considerable thought and planning on the part of the author. The same might be said in regard to the next two chapters, "Forestry that Starts with a Forest" and "Forestry that Starts with Bare Ground." Even the most casual reader will be intrigued to peruse those chapters.

To the layman, forestry usually means reforestation. Even though it is in truth only a part of the whole picture, it is, nevertheless, a very important part, and

it is to be regretted that Professor Allen has given reforestation such a small place in his text (a bare 13 pages out of some 350). The description of actual planting, both as to "site preparation and tools," reflect Professor Allen's experience in the sandy soils of Michigan, without specifically saying so. From a national standpoint the picture he gives of planting technique is scarcely adequate or accurate.

As a fellow forester in education, I may be perhaps pardoned for mildly protesting against Professor Allen's failure to give any credit whatsoever to the splendid work in the advancement of private forestry that has been accomplished since the passage of the Clark-McNary Law in 1924. This is a chapter in forestry education which has yet to be written. In fact, the picture for private forestry is not nearly so black as one would get from reading parts of Chapters XIV and XIX. For these extension foresters who are not even mentioned, though their number is greater than that of state foresters, are working with the best forests of the country—the farm woodlots, and the results both in education and accomplishment are correspondingly significant.

It is not desired to detract in any way from the intrinsic merit of this book, which should appear on the bookshelf of any layman interested in forestry. But its failure to give adequate recognition to farm forestry either as practised or taught in this great nation of ours cannot lightly be passed by.

J. A. Cope,
Extension Forester,
Cornell University.

Herb Primer

WHAT TO DO WITH HERBS. Mary Cable Dennis. 91 pages, appendix of recipes, index. Dutton, New York, 1939. $1.50.

Miss Dennis has a garden in Normandy at her place Rien du Tout and there she grows herbs, a few each of a short list. In this little book she chats informally and pleasantly about them and describes how she makes her pot pourris, her vinegars, and flavors her salads and roasts with the herbs from her garden. A bouquet of hyssop, rue and wormwood keeps the flies away; and for her the borage grew so tall she had to chop it down with an axe.

The book is well written but it is scant and limited in material and not in the least original. However, in these days when so many gardeners are interested in growing the herbs it will prove stimulating, for it tells in a sprightly fashion ways of using these aromatic plants with their ancient family trees.

Helen M. Fox.

State Flowers

STATE NAMES, FLAGS, SEALS, SONGS, BIRDS, FLOWERS AND OTHER SYMBOLS. George Earlie Shankle. Revised edition. 522 pages, indexed, illustrated. H. W. Wilson, New York, 1938. $3.50.

Here is a most useful source of authentic information based on historical documents. The chapters dealing with the manner of selection and significance of the official state flowers, trees and birds are of particular value in a nature library.

Elizabeth C. Hall.

Plants in Solutions

PLANT CHEMICULTURE. A Guide to Experiments in Growing Plants Without Soil. C. D. Dawson and M. V. Dorn. 3rd Edition. 130 pages, illustrated with photographs. Pacific Carbon & Printing Co., Los Angeles, Calif. 1939. $1.

This popular discussion of tank farming, water culture, hydroponics or chemiculture includes a brief history of the water culture method, a description of equipment, numerous formulae with directions for their preparation, brief references to the diseases which may develop, instructions on planting and several pages devoted to companies from which supplies may be secured and to various general texts.

The authors are enthusiasts, not scientists. They accept as demonstrated the creation of life from chemical compounds (spontaneous generation), the beneficial effect on plant growth of water activated by electrolysis (confirmed in their own experiments with electrolized sea water), refer to chlorophyll as a wax and confuse or mistake various chemical symbols (Sb for arsenic, Po for phosphorus). The reader of this book should do well to consult also the bulletin by Hoagland and Arnon on the same subject.

W. J. Robbins.

Genetics for Students

PRINCIPLES OF GENETICS. Edmund W. Sinnott and L. C. Dunn. 3rd edition. XIV + 408 pages, 147 figures, index. McGraw-Hill, New York and London, 1939. $3.50.

The third edition of this well-known work maintains the high standard of excellence set by earlier editions. In its general conception it remains essentially unaltered. It is still a book written primarily for the beginning student of genetics and is not specifically designed for popular consumption. As in previous editions, its style is clear and concise and its organization logical.

In general, the arrangement of material follows the pattern established in other editions. Some important alterations and additions are to be noted, however, of which the following may be mentioned:

The section on statistical methods no longer appears as an appendix, but is broken up and distributed in such a way that particular methods are considered in connection with the problems which they are able to solve. In this way the usefulness of the statistical treatment is decidedly enhanced.

The chapter on Genes and Chromosomes is rearranged and brought up to date by reference to recent work, including that on Dipteran salivary gland chromosomes.

A new chapter on Cytoplasmic Inheritance is introduced, an indication of the progressive spirit in which the book is written.

Chapters on the Origin of Hereditary Differences, Genetics and Evolution and Genetics and Development have been shortened and modernized, new material being introduced by way of illustration. As a matter of fact, condensation is one of the chief features of the third edition. In spite of added material, the total length of the book is decidedly less than that of the second edition.

A number of new illustrations have been introduced, and a copy of Bridges' map of the salivary gland chromosomes in *Drosophila melanogaster* now appears as the frontispiece.

The problems for which this text has been noted have been improved. Greater variety has been introduced; the total number of problems has been increased and their usefulness somewhat enlarged by placing them at the ends of the chapters instead of the end of the book.

Literature citations still remain at a minimum. The book thus remains an elementary text-book rather than a source-book for advanced students.

Teachers of genetics will be glad that this excellent text has been revised and brought up to date. It deserves to occupy the same position of prominence in the field of genetical text-books which was held by previous editions.

RALPH E. CLELAND,
Indiana University.

Current Literature At a Glance*

By Virgene Kavanagh

Desert Garden. Arizona is developing a Desert Botanic Garden and Arboretum at Phoenix. -*Cactus and Succulent Journal*, February, 1939.

New Periodical. *Microentomology* is one of the newer publications added to the library. Published at Stanford University, California, it is now in Volume 3, Part 3.

Man-Eaters. The stories back of the reports of "man-eating trees" are told in "Carnivorous Plant and the Man-eating Tree" by Sophia Prior in Botany Leaflet 23 of the Field Museum of Natural History.

Cabbage Virus. Black ring has caused considerable damage to California's crops of winter cabbage and cauliflower. In greenhouse experiments the virus was transmitted by cabbage and green peach aphids and it infected numerous other species of plants.—*Journal of Agricultural Research*, December 15, 1938.

Hay-Fever Plants. "Weeds, Waste, and Hay Fever" presents a loud and heartfelt plea for conservation and restoration of America's natural vegetation, which contained very few plants which ordinarily cause hay fever. The trouble-makers are among the introduced plants and undesirable ones which spread by the reduction in soil fertility which prevents less harmful plants from holding their own—R. P. Wodehouse in *Natural History*, March, 1939.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Pennsylvania. Lists of recommended shrubs, bulbs, and other plants, chiefly new or little known subjects, with addresses of nurseries from which they may be procured, is a useful feature of the *News Letter* of the Garden Club Federation of Pennsylvania, published at 1600 Arch St., Philadelphia. Among the plants suggested are such shrubs as *Zenobia pulverulenta* and *Parrotia persica* and the iris and peony originations of Mrs. Arthur Hoyt Scott, who is a member of the Corporation and the Advisory Council of the Botanical Garden.

National Park. Support for the proposed John Muir - Kings Canyon National Park in California, immediately north of Sequoia National Park, is recommended as a memorial to the "Father of the National Parks" in Publication No. 74 of the Emergency Conservation Committee, New York City.

Insecticide. Basic copper arsenate, Cu ($CuOHAsO_4$) is as toxic to the insects on which it has been tried as is acid lead arsenate, but it acts more slowly so that the insects eat a larger dose before they stop feeding. It is safer on most plants than other arsenic compounds.—*Journal of Economic Entomology*, February, 1939.

Plants in Sand. Sand cultures may be a practical solution of many problems for both amateur and professional gardeners, and many people will find them preferable to the more popular water cultures. The sand can be kept in various kinds of containers, can be used again and again if it is freed from fungi, and can be used to start seedlings or to grow plants to maturity if the proper fertilizers are used.—The Sand Culture of Seedlings and Mature Plants, A. A. Dunlap, Connecticut Agricultural Experiment Station. Circular 129, February, 1939.

Bamboo. The Rhode Island Experiment Station has grown bamboo for eight years now. It promises to be quite useful as a soil holder and as a source of plant stakes, and it has possibilities also as a windbreak and as an ornamental background plant.—A. E. Stene in *American Nurseryman*, March, 1939.

Ecology Papers. *The American Midland Naturalist* for January 1939 contains the proceedings of the conference on plant and animal communities held at the Biological Laboratories at Cold Spring Harbor, L. I., August 20-September 2, 1938.

Mowing. How and when to mow a lawn to obtain a more vigorous turf are told in *Lawn Care* for March, 1939, published by O. M. Scott Company, Marysville, Ohio.

Notes, News, and Comment

Rock Garden Week. Rock Garden Week will take place this year at The New York Botanical Garden May 21-28, with May 22 and 23 set aside as members' days.

Wallflowers. A feature of the spring display throughout the month of May at The New York Botanical Garden will be a bedding arrangement of English wallflowers in the conservatory court. Nearly 3,000 plants in the varieties ***Cloth of Gold*** (bright yellow), ***Fire King*** (flame), and ***Vulcan*** (a deep velvety red) will be shown with deep red Darwin tulips.

Crowds. Easter Sunday brought more than ten thousand visitors to the Botanical Garden to see the conservatory displays, for which a third house, besides the two which are customarily used, was filled with seasonal flowering plants. Most of the visitors also went through the cactus and succulent houses, the tropical rain-forest, tropical fern collection, palm house, and others. Many walked over to the Thompson Memorial Rock Garden, where they found a number of early flowers in bloom, and still others spent some time in the Museum Building. To handle the crowds in the main conservatories, the City of New York provided eight special police, two of them mounted officers for the automobile traffic, four uniformed, and two plain-clothes men, to supplement the Garden's own contingent of ten guards and six gardeners who served throughout the day, the latter wearing distinguishing arm-bands. The Sunday following Easter brought out still larger crowds.

Art Exhibits. Beginning April 22, three art exhibits have been scheduled to be shown in the rotunda and on the mezzanine in the Museum Building, each one in connection with one of the Saturday afternoon lectures.

Mary Elwes, English artist, lent the Botanical Garden a group of her paintings of English gardens to be shown from April 22 to May 5.

Underseas life off the coast of the Bermuda Islands is the subject of 24 paintings by Else Bostelmann being shown for two weeks beginning May 6. At the same time, continuing through the month, there will be on the mezzanine a collection of seashells lent by Walter H. Smith, accompanied by specimens of algae from the North American coastline.

Wild flower paintings by Edith F. Johnston, the originals of the lithographs in Margaret McKenny's new book on wild flowers for children, will be shown in the Museum Building beginning May 20.

Children's Show. New York youngsters living in districts where flowers are seldom seen were treated on March 21 and 22 to the third annual free flower show in Germania Hall on Second Avenue. Thirty-five hundred boys and girls attended the show, which was organized and continues under the personal management of P. J. McKenna of The New York Botanical Garden. At the close of the International Flower Show many exhibitors contributed plants for the children's exhibit. In addition, Bobbink & Atkins sent a great many plants, including cut flowers, while others were provided by wholesale florists and gardeners on some of the large estates. Protection of plants in the city's parks was one of the lessons taught, and prizes were awarded to the children writing down the best statements regarding the show and what it meant to them.

Gypsy Moth. Complete extermination of the gypsy moth in the Bronx has been achieved by the Conservation Department of the State of New York, according to a statement from H. L. McIntyre, Superintendent of Forest Pest Control, in a letter to Dr. B. O. Dodge. In July 1935 Mr. McIntyre contributed an article to the Journal in which he told of the State's campaign against this pest and begged the people to co-operate by destroying every living evidence of the moth.

A survey that was started in the Bronx in the fall has just been completed, and no sign of the gypsy moth has been found. "In view of the fact," Mr. McIntyre writes, "that we made a very thorough search in this same locality a year ago, without finding any sign of the insect, we feel justified in stating that complete extermination has been achieved."

Lily Committee. Dr. A. B. Stout was in Philadelphia March 25 to attend a meeting of the Lily Committee of the National Horticultural Society and attend the Philadelphia Flower Show.

Lectures. Staff members who have recently appeared on lecture platforms include the following: T. H. Everett, speaking on the Thompson Memorial Rock Garden April 3 before the garden department of the Bronxville Women's Club; "Fundamentals of Garden Practice" April 19, Greenwich Woman's Club; H. N. Moldenke, "Cultivated Trees and Shrubs of New York City" March 30, Westchester County Tree Protective Association; "Some Marvels in Adaptation among our Local Plants" April 4, Garden Club of Madison, N. J.; "Treasures of the Watchung Hills" April 20, Garden Club of Morristown, N. J.; P. J. McKenna, "Roses" March 7, Englewood Garden Club; "Hardy Bulbs" April 17, Mt. Vernon Garden Club.

Conference. "Rare Myxomycetes Collected Recently" was the subject of Robert Hagelstein at the monthly conference of the scientific staff and registered students of the Garden April 14. During the same hour Dr. H. A. Gleason spoke on "The Genus *Clidemia* in Mexico and Central America" and Dr. W. H. Camp on "The Genus *Rochefortia*."

Early Botany. A copy of "Hortus Americanus" 1794, by Dr. Henry Barham is among the books recently acquired by the library. Others in the group are "A Family Herbal" by Richard Brook, "Medical Botany" by A. I. Coffin, M.D., and Potter's "Cyclopaedia of Botanical Drugs and Preparations."

Author. Mrs. Theron G. (Martha Prentice) Strong, was elected a member of the Women's Auxiliary of The New York Botanical Garden (precursor of the Advisory Council) on April 3, 1919, having been nominated by Dr. Britton. Two years later, on April 21, she was chosen secretary and served four years in that capacity. Today, at the age of 88, she still retains her active association with the Garden. Her article, "Cacti in the Northeast," begins on page 109.

THE NEW YORK BOTANICAL GARDEN

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, annually, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twenty-first volume. Subscription price, $10 a volume (four years). Not offered in exchange. Free to members of the Garden.

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Contributions from The New York Botanical Garden. A series of technical papers written by students or members of the staff, and reprinted from journals other than the above. Price, 25 cents each, $5 a volume. In the fourteenth volume.

Memoirs of The New York Botanical Garden. A collection of scientific papers. Volumes I-VII. Titles on request.

Direct all orders to The New York Botanical Garden, Bronx Park, New York, N. Y.

* * *

DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge into the Garden grounds.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

June, 1939

ROSA SPINOSISSIMA, FLOWERING IN MAY — Cover Photograph by Fleda Griffith

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THE ROSE GARDEN

When members of The New York Botanical Garden and others attend the Rose Conference at the Garden June 6 and 7, they will not only hear some of the country's best-informed men and women speak on many aspects of the culture of roses, but they will also see in a natural rose bowl nearly 600 different kinds of roses in early bloom.

True to the spirit of the work which has been done for years by Bobbink & Atkins in testing and making known the finest roses of all periods, this garden, the plants in which are largely the gift of this firm, contains a wide selection of roses of many types. In this way it fulfills one of the primary horticultural purposes of the Botanical Garden, which is to grow and exhibit as many different kinds of plants as current horticultural practice and future possibilities make desirable A Botanical Garden thus differs from a park or a private garden, in which the aim is more often to create a pleasing scene with a few selected varieties of plants

Beauty in planting is by no means neglected here, however, and the entire garden in the rose bowl has been arranged to create a delightful view from every vantage point at its margin or within. But in this garden completeness is never sacrificed to appearances. The one is made to complement the other.

Many gardens are larger, and many have greater representations of each kind of rose that is shown, but few gardens in America can compare with that at The New York Botanical Garden for the number of varieties of roses on display outdoors from May until November.

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Fundamentals Of Rose-Growing

A Guide for the Beginner
By P. J. McKenna

THE art of rose growing may be said to consist of two phases. The first consists of the work of the initial preparation involving fundamentals that should be rather closely adhered to, while the second considers certain cultural practices which vary with local conditions and the wishes of the grower.

There is, of course, distinct correlation between the two phases, for it can be rightly said that the practices or methods used in the actual growing of roses are but an extension of those used in the initial preparation and planting. We will approach the subject therefore with a discussion of the fundamental needs of the rose.

What are those needs?

Drainage. Perhaps the most important from the standpoint of healthy roses is the question of proper drainage. It is true that roses require considerable moisture during their growing season, but anything approaching a waterlogged condition of the soil is a detriment to healthy growth in summer, while in winter such a condition is the chief cause of winter killing. All excess water should have some means of draining away, the method used depending upon the nature of the soil and of the site.

A soil underlaid with a sandy or gravelly subsoil affords good natural drainage, as does a site that is sloping. A hard impervious subsoil, however, needs treatment. Sometimes it merely requires to be broken up to a depth of 3 feet to provide the necessary drainage and permit of the excess water being carried away.

Drainage can be still further aided by digging the beds 3 feet deep and placing in the bottom some coarse material such as broken bricks, stones, gravel, or even cinders to a depth of 9 to 12 inches. On top of this material place some sods, grass-side down; these will prevent the soil from being washed down through the drainage material. Extreme instances of stiff clay soil or a low-lying site may require the installation of agricul-

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tural drains, but this job should be undertaken only by someone who thoroughly understands the problems involved.

The Soil. Good root action and vigorous growth are possible only in a soil of good tilth, particularly in the region immediately surrounding the roots. This is obtained mainly by soil preparation at 2 feet depth, with the incorporation of old manure or old compost that will lighten the soil, render it friable, and assist in forming that loose granular structure that makes free root action possible.

In this region also should be distributed the essential food materials. Manure and other fertilizers buried more than 2 feet down are of little actual use to rose plants. They should be kept within the upper 2 feet of soil where the roots are usually confined. If this work can be performed some time in advance of planting to allow for subsequent settling and amelioration of the soil it will add still further to the ultimate success of the plants.

Planting. The actual operation of planting embodies a few details that should be emphasized strongly. Briefly, they are:

1. Dig the hole wide enough to permit of the roots being spread out, the better to insure contact with the soil.
2. Keep the roots constantly moist during the process of planting to prevent them from drying out. Immerse them in a pail of water or cover them with wet burlap.
3. See that the soil is friable, not wet and soggy when planting. The proper condition of the soil is one of the prime essentials, yet it is all too frequently neglected.
4. Work the soil thoroughly among the roots and set the plants in firmly.
5. Water well *after* planting to settle the soil around the roots.

To attempt to work a soil when it is wet and sticky is inviting trouble. Even though it may incur a delay in getting the plants into the ground, it is better to wait until the soil is in proper condition before planting. Handling soil when it is wet will injure the soil structure and defeat that purpose which we originally had in mind: the maintenance of a good granular condition to encourage free root action.

Depth to plant will depend on the kind of soil. In a light soil one can plant much deeper than in a heavy soil. A good general rule to follow in planting roses is to have the junction of the stock and bud about 2 inches below normal soil level.

With soil preparation and planting considered, we now approach the second phase of the subject.

Pruning. Of all the operations consequent upon rose growing, that of pruning seems to offer the greatest difficulty to the beginner. All pruning

Photograph by J. Horace McFarland, courtesy of Bobbink & Atkins

President Macia, a Hybrid Tea, is reputed to stand up well year after year.

is based upon one cardinal principle—the habit of flowering; that is, whether the plant produces flowers on the current season's growth or on growth of the previous year.

Hybrid Tea and Hybrid Perpetual roses bloom on the current season's growth, hence are pruned after the same fashion each spring, while Climbing and Rambler roses bloom on growth produced the previous year, therefore they are pruned after blooming by cutting back during the summer.

Hybrid Perpetuals, because of their more robust growth, are usually not cut back as much as Hybrid Teas. A good method to use in pruning is first to remove all thin growths, leaving just the several main canes. These are then cut back to a length commensurate with their vigor. In Hybrid Perpetuals this may be from 18 inches or more in length to as low

as 6 inches in hybrid teas. If the canes are killed back, as happened in this past winter, then there is no choice left but to prune back to the first live bud. This work should all be performed in spring when the buds have developed enough to be able to select them. All cuts should be made one-quarter to one-half inch above the bud selected.

The pruning of Climbing and Rambler roses presents a different problem; these are pruned after flowering, usually in July or early August. There are two main types. In one, numerous thin canes are produced in great profusion from the base each year. It is on these canes that the flowers of next year will be borne. Pruning in this case consists of merely removing the canes that have already flowered and tying in the new canes for bloom the following year.

Plants of the second type require a somewhat different method of treatment, for they bloom best on wood that is two, three, or four years old and not so much on one-year-old wood. They are best recognized by their having thick canes and large wicked thorns. As a rule they do not produce a great profusion of new canes each year. Pruning therefore consists not in removing the main canes but in cutting back the side growths that have sprung from the main canes. Each year, too, it will be necessary to train in one or two new canes and to remove the same number of the very old and woody ones, thus keeping a balanced renewal.

All climbing and rambler roses when newly planted should have all growths cut back to the base and given a fresh start.

Feeding and General Maintenance. To have thoroughly prepared the soil and incorporated in it old cow manure and bonemeal in sufficient quantity to supply the initial needs of the plants is sound practice, but, in order to maintain the plants in health and vigor, some form of supplemental feeding will be necessary.

Established roses should have a top-dressing of cow manure and fine bonemeal each spring; this is lightly forked into the surface of the bed, taking care not to injure any roots.

About the beginning of July an application of tankage or dried blood should be applied at the rate of 3 pounds per square yard, and watered in with a hose at ten-day intervals until the end of August, when all feeding should cease to permit of the canes ripening before the approach of winter. All fertilizers should be applied when the soil is wet or they should be watered in immediately afterward.

Clean cultivation of the soil should be practised throughout the growing season and all spent flowers should be removed to conserve the vigor of the plants as well as for sanitary reasons.

Winter Protection. The last operation consists of hilling up around the plants for winter protection. This is done after frost has stopped all growth. Tall plants are reduced in height by shearing of the tops. The plants are then hilled up around their base with soil or a mixture of soil

and coal ashes. With this covering, water drains away and the canes are kept dry, which would not happen were any other material, such as old leaves or strawy manure, used for their winter protection.

Roses require attention all during their growing season. Practical ways of keeping them free from diseases and pests are given by Dr. B. O. Dodge in another part of this Journal.

*Outstanding Roses New to the Rose Garden This Year**

PHYLLIS GOLD. Hybrid Tea. A Gold Medal Winner of the National Rose Society (England). A rose of fine shape and color with a promising future.

PINK DAWN. Hybrid Tea. Not exactly new, but the finest pink introduced in the past four years. It combines good growth, color, form, and disease resistance.

QUEENSLAND BEAUTY. Hybrid Tea. Like Golden Dawn, from which it came, it is remarkable for healthy foliage and its ability to keep on flowering when others are past their best.

PICTURE. Hybrid Tea. A lovely rose which has been neglected for some unknown reason. Its possibilities have recently been realized and Bobbink & Atkins intend to make it one of their main varieties.

LADY LINDSAY. (This was 1207-C last year). A new type of rose developed by Dr. Whitman Cross. Bred for vigor, rather than perfection of flower, it has remarkably fine clean foliage, produces large clusters of flowers continuously, and is in general a strong growing, fool-proof, shrubby rose adaptable to almost any situation.

GOLDEN DRUSCHKI. Hybrid Perpetual. A golden yellow counterpart of the old favorite Frau Karl Druschki. A welcome addition, as yellows are scarce in this class.

GOLDEN KING. Rugosa Hybrid. Although classed as a Rugosa, the foliage and flower are of Hybrid Tea form, similar to Dr. Eckener.

DELICATA and STELLA POLARIS. Two very fine improvements on the true Rugosa type.

LADY BOUNTIFUL. Climber. A seedling of American Pillar with remarkable Rugosa-like foliage, which looks as if it might develop into a first-rate creeper.

Additional Roses of Note

Hybrid Teas

AMI QUINARD
MRS. PIERRE S. DU PONT

Polyanthas

HEIDEKIND
VALERIE
SWANTJE
HYTHE CLUSTER

Rugosas

AGNES
AGNES EMILY CARMAN
POLAR BEAR
ROSERAIE DE L'HAY
SANGUINAIRE
ATROPURPUREA
BENEDIKT ROEZL
CARMEN
ENCHANTRESS
HILDENBRANDSECK
SNOW DWARF
SOUV. DE PHILEMON COCHET
STERN VON PRAG
THUSNELDA
VANGUARD

Climbers

APRICOT GLOW
GOLDEN ORANGE CLIMBER
MINNEHAHA
NUBIAN
PEGGY ANNE LANDON
REICHSPRAESIDENT VON HINDENBURG

Hybrid Perpetuals

EMPEREUR DU MAROC
ECLAIR
GIANT OF BATTLES
KING GEORGE V
PHILIBERT BOUTIGNY
REINE DES VIOLETTES
TOM WOOD
URDH
VICTOR TESCHENDORFF
EVEREST
GLOIRE DE MARGOTTIN

* These lists were prepared by the late William Murray of Bobbink & Atkins, whose untimely death occurred late in April, in the midst of preparations for The New York Botanical Garden's Rose Conference, in which he was to have played an important part.

Old-Fashioned Roses Live Again At The Botanical Garden

By Mrs. Frederick L. Keays

THE planting of a border of old-fashioned roses this year at The New York Botanical Garden, through the courtesy of Bobbink & Atkins, will bring these worthy flowers to the attention of thousands of people who for the first time will realize how lovely and distinctive are these favorites of former days. Other persons, remembering them from the past, will be surprised to learn how many have survived through long years of neglect.

Interest in the preservation of old roses never really died out. Sentimental attachment helped to perserve certain ones. Families have kept them through several generations. Migrations carried them over the country, with the outcome that they are found almost everywhere. Of late, appreciation of their beauty, fragrance, and hardiness has been steadily mounting. The movement for their preservation has been stimulated by the collecting and restoring of forgotten roses by Mr. L. C. Bobbink and other lovers of these sturdy, faithful types.

At the time the earliest settlers established roses in their colonial gardens, choice was very limited. There were the four main species, *Rosa gallica, R. centifolia, R. alba,* and *R. damascena*; also ancient ***Maiden's Blush*** and ***Celestial,*** forms of *alba*; ***York and Lancaster,*** a form of *damascena*; a few spontaneous variants; and ***Sweetbrier, Cinnamon,*** and such other sorts as we find noted in the books of the herbalists. By 1785, time of William Marshall's "Planting and Rural Ornament," natural hybridizations and vigorous seed planting had brought forth a small list of varieties of the four great species, of ***Sweetbrier,*** and of ***Scotch*** roses. Climbing roses at that time included *R. sempervirens, R. alpina* (now known as *R. pendulina*), and both single and double Musk roses.

Two everblooming roses from China, ***Old Blush China*** and ***Red China*** were introduced in 1789 and hailed with delight. Soon there came a series of crosses between June bloomers and the China ever-bloomers—probably one cross only resulting in a great new class called Hybrid Chinas: roses with fine foliage, splendid large strong blooms in a range of colors, with a blooming period of five or six weeks but showing no tendency to repeat. One variety and an outstanding one is placed in the border planting, ***River's George the Fourth.*** The class was prominent a hundred years ago and more; now it is almost lost. So far only five surviving varieties have been reported, to our knowledge.

Early in the 19th century rose interest was stimulated by two events: the introduction of the pink and the yellow Tea roses; and the creation of

the rose garden at Malmaison by the Empress Josephine, in which every rose known and procurable was planted. New varieties of the June-blooming roses, including Moss roses, and of China and Tea roses followed this wide view of the genus *Rosa*. The classes known as Bourbons and Noisettes came in. A new class which became the Hybrid Perpetual had its experimental stage. It was an exciting time.

Countless varieties have now been lost forever. Naturally the surviving old roses are the most self-sufficient kinds, capable of holding their own against neglect, against smothering grass and weeds, and bad weather. Fragrant, they are, of fine rose form, of clear frank color, distinctive foliage; roses of stout structure with a will to live.

Fragrance cannot be dissociated from a desirable rose. In most old roses fragrance is delicious: the old-timey scent of *Rosa centifolia*, sharp and stimulating; the rich deep scent of *damascena*, suggesting warmth and permanence; the clean, healthy, honest scent of *gallica*, and the tender sweetness of *alba*.

Beauty in rose form is not restricted to one long-budded, high-centered form. Far from it. Cupped, globular, expanded, imbricated forms are among the beautiful forms in old roses, with the outline often a perfectly flowing curve of the circle.

Foliage, prickles and growth present the distinguishing characteristics, however, and are largely the basis of classifying old roses. The type form of *Rosa gallica*, for instance, has thickish tough leaflets, five in number, pubescent beneath and smooth above, on stalks with small, weak prickles, standing about three feet high, bearing semi-double, deep rose-pink blooms with a brilliant ring of stamens, singly or in twos or threes, large in proportion, fragrant, with short sepals, a roundish calyx tube which matures into a round hip filled with large, healthy seeds.

Rosa Mundi and ***Marmorata*** should appear close to type. The group to which they belong, producing seeds freely, developed a vast number of forms. The named varieties in the planting are of that high period, 1830 to 1850, so far as it is possible to date them. Colors range from the pale flesh of ***Belle Isis*** and the white with pink center of ***Louise Méhul*** to the dark purple of ***Cardinal Richelieu.*** Others are striped, marbled or spotted.

Rosa centifolia has broad, down-dropping, sometimes quite wrinkled leaflets, the edges deeply serrated and glanded; handsome foliage on stalks with unequal prickles, some strong, some weak; the plant branching and rising to five feet and more. The globular blooms are very full, very fragrant, good clear pink, often nodding on a long stem, coming singly from ends and along the stalk. As the blooms open the "cabbage" form is shown with stamens hidden. Sepals in the type form do not reflex. The calyx tube is oval, developing into an oval hip. Varieties of *R. centifolia* will be found lacking or reversing typical details, but on the

large count carrying *centifolia* characteristics. Varieties in the Garden's planting spread over a period from the undated ***Red Provence*** and ***Rose des Peintres***, to ***Königen von Dänemark*** and ***Variegata di Bologna*** of quite modern times. Some varieties have not kept the cabbage form of bloom. Some have foliated sepals and reflex them. ***Mme. d'Hebray*** has foliage so wrinkled that it appears blistery and rusty red.

In the common Moss rose the winged and glanded characteristics of *R. centifolia*, of which it is considered to be a sport, are much exaggerated, while other features are typical. Possibly it is more upright in growth. Varieties of the Moss rose were very popular during the early Victorian decades. The named varieties in the planting date between 1840 and 1860. ***Crested Moss***, a charming rose, seems more like *R. centifolia* than Moss, as the little bunches of bristles are not glanded. It goes often by the name ***Chapeau de Napoleon*** and dates back to 1827. In Moss roses we have a wide range of color from soft flesh-pink to deep purple, maroon, and near-black. The general opinion seems to be that when a variety shows these deep colors *Rosa gallica* has entered into its composition.

Rosa damascena, like *R. gallica* and *R. centifolia,* in its earliest forms goes back to the time of Pliny, Virgil and Horace. It is said to be the rose of the Crusaders; it was the rose of the early Spanish missions in America, quite definitely. Leaflets of *R. damascena* are paler, moderately large, five to seven in number, not leathery, and the young foliage is quite downy. Stalks are fiercely armed with prickles; they rise to about four feet, and carry fragrant pink blooms about which Parkinson says, "The flowers are of a fine deep blush colour, as all know, with some pale yellow threads in the middle, of most excellent sweete sent far surpassing all other roses in Flowers." By "far surpassing" he probably meant that, as they bloom in a corymb, there are more of them. The reflexing sepals are often prettily winged and long pointed. The calyx tube is longer than the others; the hip bright red and rather soft.

Rosa damascena showed a repeating tendency as early as the time of Virgil, who wrote about its "two springs". In her book of plates of 1797 Miss Mary Lawrence shows white, pink and red Monthly Damasks, called also "Roses of Four Seasons." Information is not very clear as to how these Monthly Damasks contributed to or passed on into a new class sufficiently distinct to be given the name of Damask Perpetual, "Damask roses blooming in the autumn", very highly perfumed, with a wide range of color. The Hybrid China roses remarked about above, crossed with Damask Perpetuals, provided the greater part of the new class called Hybrid Perpetual. Here we have a composite of *Rosa gallica, R. centifolia, R. alba, R. damascena* and ***China***, standing ready but unused for years, for the crossing in of the Tea rose to make the great modern class, Hybrid Tea.

Photographs by courtesy of Bobbink & Atkins

Two typical old-fashioned roses. At left, Rosa damascena, right, Rosa gallica in the single form.

Such hardy survivors as are planted in the old rose border tell that they are roses of easy culture; that, indeed, they can live without culture. However, they will give the grower a welcome answer to his kind attention, flourishing splendidly when given sunshine, cultivation, and some fertilizer "some", because too much may push them into an excess of stalk and foliage at the expense of bloom. Otherwise they may be depended upon to bloom when expected.

They can take hard pruning but seem more rewarding when planted where they can go their own gait, being merely cleaned of dead wood and shortened for protection against rocking wind. In general they like sun and air, the Mosses, especially, wishing for a sunny, airy location. Old roses gather up their share of blights. Mildew delights to abide on their foliage and worms like to chew their sweet buds. They should therefore be sprayed; but they can take the blights. They have endured mildew and worms for generations, or we would not be having them today.

When growing on their own roots these June-flowering old roses carry on propagation by root suckering, sending up stalks away from the main center. These can be cut off and planted. As a rule they will not strike from cuttings. The occasional exception is in *R. damascena*. It and its forms can be increased by budding but, judging by their generally thrifty and healthy performance when grown on their own roots, it would seem that nature intended that such old roses as these should grow their own thickets of suckers and insure their own self preservation.

List of Old-Fashioned Roses Planted at the Botanical Garden

Rosa gallica and hybrids

ROSA GALLICA MARMORATA
ROSA MUNDI
ROSA GALLICA
BELLE ISIS
CRAMOISI VELOUTE
HYPATHIA
ADIEU DE BORDIER
CARDINAL DE RICHELIEU
LOUISE MEHUL
NOUVELLE TRANSPARENTE
DESIREE PARMENTIER
DUMORTIER
DUCHESSE DE BUCCLEUGH
DUC DE GUICHE
PRESIDENT DE SEZE
PEPITA
LA COURONNE TENDRE
JEANNETTE
MERCEDES
MME. SAPORTAS
PHOEBUS
ROYAL MARBREE
ROSE PONCHEAUX
TRICOLOR

Rosa damascena and hybrids

ROSA DAMASCENA
JACOBUS VARIETY
KAZANLIK
MARIE LOUISE
MME. HARDY
PROF. EMILE PERROT

Rosa centifolia and hybrids

ROSA CENTIFOLIA
KONIGIN VON DANEMARK
ROSE DES PEINTRES
VARIEGATA DI BOLOGNA
VIERGE DE CLERY
PETITE ORLEANAISE
RED PROVENCE
WHITE PROVENCE
POMPON DE BOURGOGNE
ROSA BURGUNDIACA
DUC D'ANGOULEME
MME. D'HEBRAY

Rosa centifolia muscosa

MUSCOSA JAPONICA
MALVINA
GOETHE
QUATRE SAISONS
CAPITAINE JOHN INGRAM
CATHERINE DE WURTEMBERG
JEANNE DE MONTFORT
LANEII
MARIE DE BLOIS
OLD PINK MOSS (COMMUNIS)
CELINA
CRESTED MOSS
DUCHESSE D'ISTRIE
NUITS DE YOUNG
KING GEORGE IV (CHINA HYBRID)

L. C. Bobbink Honored By Botanical Garden

IN honoring Lambertus C. Bobbink by the dedication of a bronze plaque in the rose garden, The New York Botanical Garden is bringing recognition to the man who more than any other is believed responsible for the widespread use and successful culture of roses in America today. The plaque is to be unveiled by Pearl Buck, Author and Nobel Prize Winner, June 6 at 3 p.m., with Joseph R. Swan, President of the Garden, presiding.

Coming to America in 1895 as salesman for a syndicate of Holland nurserymen, Mr. Bobbink found in use here only a small assortment of

shrubs, scarcely half a dozen kinds of Hybrid Perpetual roses, and almost no well grown Hybrid Teas. Moreover, there was little appreciation for the large variety of fine woody plants which he had to offer. After he had passed a successful apprenticeship in Holland, spent three years at work in nurseries in Germany, nearly as long in France including a year at the Jardin des Plantes, and three years more with nurseries just outside of London, his first American venture appeared to be a failure.

But the following year he came back, bringing some stock of his own, and with this he set himself up in business at Rutherford, New Jersey. Before the end of the century, the partnership of Bobbink & Atkins was formed, and the business grew, as Americans learned of the beauty of these new types of nursery stock. Bobbink & Atkins became the pioneer importers in quantity of boxwood, bay trees, many coniferous evergreens, rhododendrons, azaleas, and palms, and were the original introducers of much of our choicest ornamental plant material which is in use today.

Always a shrewd plantsman, with an almost instinctive knowledge of plants, their varieties, their culture, and their future possibilities, Mr. Bobbink soon began specializing in roses. Until about 1914, most nurserymen believed that the production of field-grown roses on a commercial scale in America was impossible. Their failure had apparently been due to the use of unsuitable species for the understock, so Mr. Bobbink determined to find the right sort. For eastern United States, he discovered, the most successful stock was the Japanese strain of *Rosa multiflora*. His use of this stock, plus his introduction of many new varieties of Hybrid Teas from abroad, did more than anything else to increase the use of roses in eastern North America. Had it not been for his exceptionally keen knowledge of roses and his persistent experiments with them, American gardens today might be nearly barren of one of their loveliest and most reliable flowers.

Not only did Mr. Bobbink introduce many new varieties, but he also sought out the finest of the old roses. To him great credit is due for the re-introduction of the charming old-fashioned roses into the gardens of today.

Mr. Bobbink's uncanny instinct for what is best in plants has brought great horticultural riches to America. His popularization of the rose has had far-reaching effects. His gifts of rose plants to important rose gardens in America have served to acquaint the public with the many roses that can be grown successfully in this climate. While many gardens have benefited from his generosity, The New York Botanical Garden is especially indebted to him, for since 1923, the rose garden, which now contains more than 6,000 plants in about 600 choice varieties and natural species, has been largely the gift of the firm of Bobbink & Atkins; especially, since Mr. Atkins' death, of Mr. Bobbink personally.

Some Suggestions For The Control Of Common Diseases And Pests Of Garden Roses

By B. O. Dodge

IN previous issues of this Journal[1] the writer has discussed some of the common practices now in use in the control of fungous diseases and insect pests of roses. As these numbers are no longer generally available to our readers, it may be timely to review some of the principles involved in growing healthy roses. Mildew and black-spot are still our most troublesome enemies.

Rose Mildew

Every rose grower is familiar with early symptoms of infection by the powdery mildew fungus, where the younger leaves tend to curl, exposing the lower surface. Such leaves are apt to show a more purplish-green color than usual. Where the tip-ends of the canes of pole roses are infected, leaves are dwarfed and deformed. Young canes may be infected downward from the tip for a distance of a foot or more. In cases of serious infection, the ends of canes will be killed. When flower buds are infected they do not open.

The mycelium of the fungus parasite is entirely superficial. On the canes, especially, there are several layers of the fungus threads forming a mat over the surface (Fig. 1). Sections of the infected cane or leaf will show no thread actually penetrating into the epidermis, the palisade cells of leaves, or the cortex of the cane. But practically every epidermal cell will show the presence of a sucking organ called a *haustorium*. From a cell of a superficial thread or *hypha*, a very fine tube is put out and this penetrates the cuticle and outer cellulose wall of the epidermal cell, and enlarges in the cell cavity (Fig. 1, **5**). This sucking organ is surrounded by a mass of material which is probably composed of some cellulose-like substance developed by the host, possibly as a protective measure. These haustorial structures of the rose mildew have never been studied sufficiently. With every cell of the epidermis invaded, the effects on further growth may be very serious. Here is one case where sulphur or bordeaux mixture or other copper compounds actually kill the fungus mycelium; therefore they may be referred to then as true fungicides. In case of black-spot and most other fungi these compounds merely prevent the germination of the spores.

Control. As soon as hybrid teas and hybrid perpetuals have been pruned in early spring, the dormant plants should be sprayed with commercial lime-sulphur, using 1 gallon of the liquid with 15 or 20 gallons of water. Full-strength lime-sulphur may injure the more tender canes of pole roses, and this more diluted spray will be sufficient to kill most fungus spores. Later on one should begin dusting the plants with sulphur as soon as the first leaves are out. Two or three applications a few days

[1] Jour. N. Y. Bot. Gard. **30**:105-124. 1929.
Jour. N. Y. Bot. Gard. **33**:45-53. 1932.

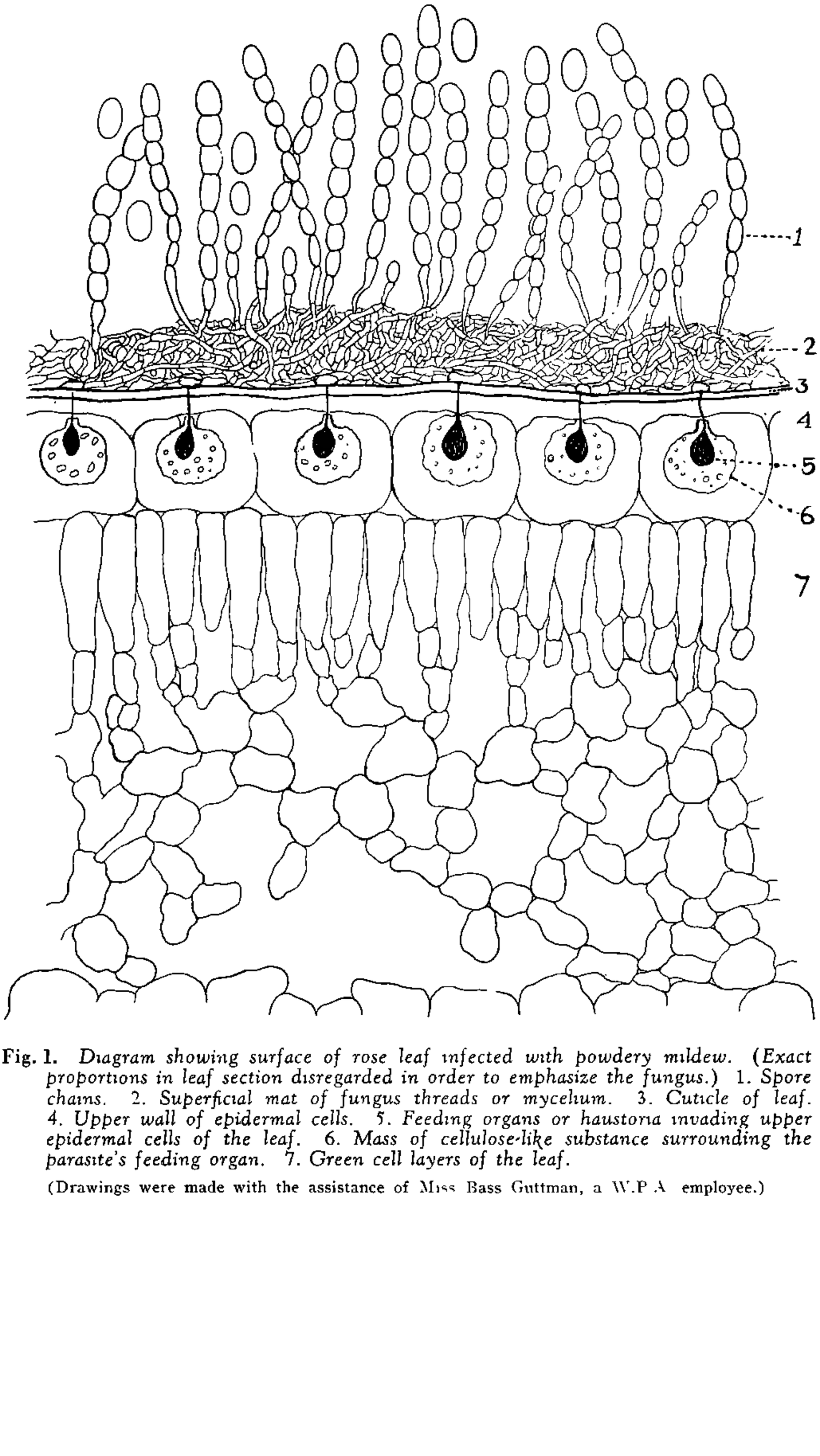

Fig. 1. *Diagram showing surface of rose leaf infected with powdery mildew. (Exact proportions in leaf section disregarded in order to emphasize the fungus.) 1. Spore chains. 2. Superficial mat of fungus threads or mycelium. 3. Cuticle of leaf. 4. Upper wall of epidermal cells. 5. Feeding organs or haustoria invading upper epidermal cells of the leaf. 6. Mass of cellulose-like substance surrounding the parasite's feeding organ. 7. Green cell layers of the leaf.*

(Drawings were made with the assistance of Miss Bass Guttman, a W.P.A. employee.)

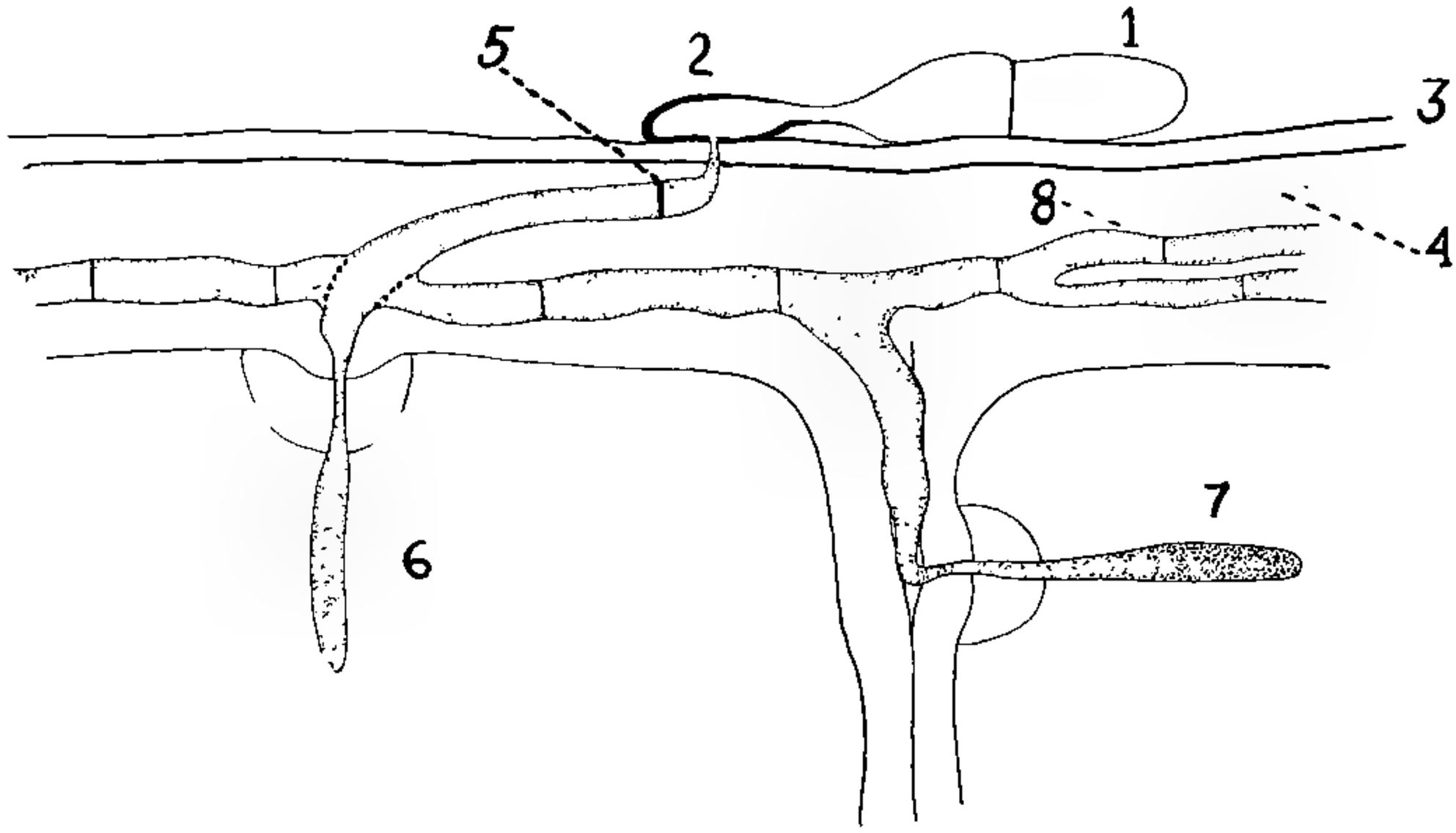

Fig. 2. *Diagram of early stages of infection of rose leaf by the black-spot fungus. 1. Two-celled spore. 2. Fungus hold-fast or appressorium. 3. Cuticle of leaf. 4. Upper wall of epidermal cells. 5. Impervious cross-wall in infection tube. 6, 7. Haustoria or feeding organs of parasite. 8. Beginning of the strands of brown fungus threads that give black-spot its color and fringed margin. (After Aronescu.)*

apart should be all that will be necessary. Later on in the season mildew will appear again unless the roses have been regularly dusted in controlling black spot. Infection by mildew occurs most readily when the air is saturated with moisture, but the spores of the parasite do not germinate well when the leaves are wet with dew or rain. This probably accounts for the fact that mildew, unlike black spot, is not favored by continuous rains.

Black-spot

There are a number of leaf-spot diseases of roses caused by fungi, insects, and other agents. Black-spot can be distinguished from other spots by the darker color and fringed borders of the spots. These occur either on the underside or the upperside of the leaf. With a hand lens very small black blister-like spore-producing bodies can be easily seen.

Probably no rose variety is immune to black-spot, but under ordinary garden conditions certain varieties are more susceptible than others. Some roses, like ***Golden Ophelia***, lose their leaves very soon after infection. Others like ***Grange Colombe***, do not easily drop their leaves, but the spots continue to grow and often become as large as a dime.

The first infections occur in early summer, the spores being brought to the underside of the leaves as a result of dashing of rain which causes the particles of soil carrying spores to be spattered upward to become attached to the lower side of the leaves. Later on, as the black-spot fungus matures, spores are carried from leaf to

leaf by insects, artificial watering, and the dashing of rain. Most infections occur on the upper surfaces then. As a rule spores germinate in films of water on the leaves. The infection tube penetrates the leaf cuticle, after which it develops in the upper wall of the epidermal cells just beneath the cuticle (Fig. 2). By the eighth hour an impervious wall (Fig. 2, **5**) is laid down by the fungus near the point of entrance so that no matter how soon afterward the sun may dry the leaf, or how much spraying is then done, further penetration of the parasite is not prevented.

Within ten or fifteen hours after spore germination the fungus sends out haustorial feeding organs into the epidermal cells and proceeds to invade the epidermis of the leaf still further, developing many haustoria. The parasite does not usually penetrate deeply into the leaf or stem tissue at this stage. The fungus threads grow in fascicles or bundles beneath the cuticle, radiating out from the point of infection. The branching is rather irregular and this gives the spot its characteristic appearance with a fringed margin. Fig. 3 gives further details of black-spot infection.

Control. While the powdery mildew fungus threads are entirely superficial, the mycelium of black-spot, as noted above, is mostly *under* the protecting cuticle, so that the application of fungicides can not kill the fungus without destroying the leaf. This is one reason why it is necessary to have the young leaves protected at all times against the original invasion by the fungus. This can be done by dusting at least once a week with a good grade of dusting sulphur; the fine sulphur granules prevent the germination of the fungus spores. Given eight hours without protection for the leaf, the fungus can gain entrance and its further progress can not be halted without destroying the leaf. Control of black-spot should begin with the gathering and burning of all fallen leaves at the end of the growing season. The fungus overwinters in these old leaves and the spores are

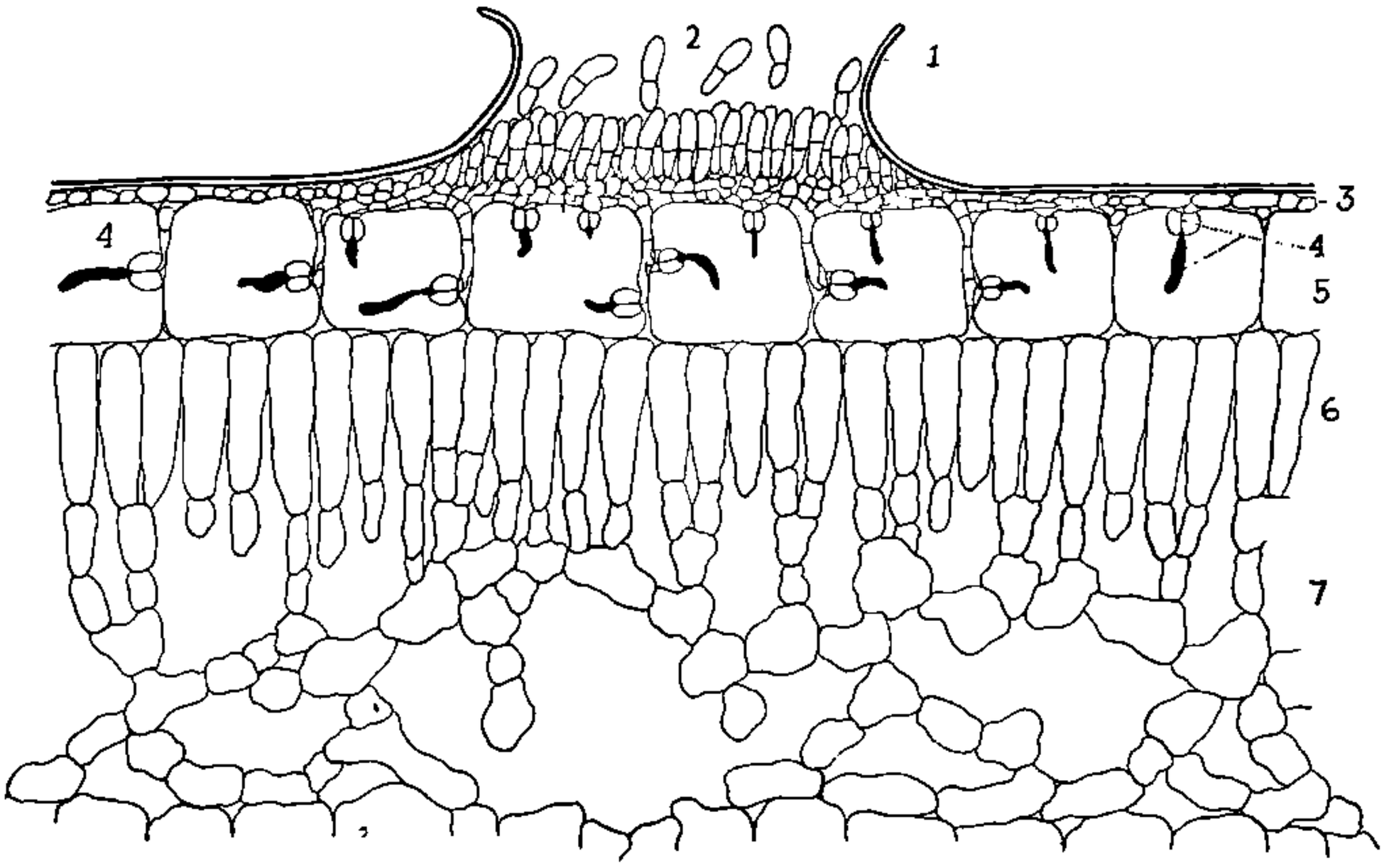

Fig. 3. *Diagram of section of leaf infected with the black-spot fungus. 1. Cuticle. 2. Cushion of two-celled spores. 3. Subcuticular threads of the parasite. 4. Haustoria or feeding organs. 5. Epidermis of the leaf. 6, 7. Green cell layers of the leaf.*

scattered to mix with the soil, which, as noted above, may be spattered upward by early rains to become attached to the lower side of the leaves. Dusting should begin as soon as the leaves are well out and continued all summer. It was formerly our custom to discontinue our dusting by the 15th of September, but we have found that many new infections occur later, as we have a long growing season in New York.

Protection of the roses one year is an assurance of good growth the next year. That half of a rose bed which has been protected while the other has not been protected will show the effect the following season; the protected plants will make a much more vigorous growth.

Certain dusting sulphurs are dyed green so that the foliage does not appear badly discolored. The addition of arsenate of lead in the proportion of 1:10 is assumed to give us not only a better fungicide but it also adds a poison for chewing insects. Dusting should be done so far as possible when the foliage is dry. A light application more frequently applied is preferable. Some roses require two or three applications a week during the season. It is not necessary to put on so much that it shows on the foliage. In the cold weather of spring or fall, sulphur is not very effective against black-spot; and as copper sprays are apt to be injurious in one way or another to roses in this area, we are still in need of the ideal fungicide for roses.

Fig. 4. *Two stages of gray mold, Botrytis, showing how it prevents the opening of the flower-buds of roses. At left, gray mold on a winter-killed cane, from where it will infect the living plant, unless the cane is cut and burned before the spores are released.*

Gray Mold or Botrytis Blight

Certain hybrid tea roses are susceptible to attacks by the fungus *Botrytis*, which prevents the blooms from opening. The buds turn brown and decay (Fig. 4). The fungus is always present where the old blooms are not gathered, and winter-killed canes often develop *Botrytis*. Sulphur dusts are not very effective in controlling gray mold. Bordeaux mixture or other copper preparations, such as Fungtrogen or Triogen, are more effective. Bordeaux mixture 4-4-50* in the vicinity of New York City, usually causes much spray injury and defoliation unless the weather is hot and dry. It has been suggested that a 2-2-50 or a 2-1-50 would control gray mold and not be as injurious. One cause of so much spray injury with bordeaux mixture is that gardeners are prone to drench the plants too much. A light application in a fine mist, stopping before one gets a run-off, would certainly prove less destructive and no doubt just as effective as a fungicide.

Brown Canker

There are several fungi that cause cankering of roses. The most destructive of these is known as brown canker. It is recognized by the light chestnut-brown discoloration bordered by a darker purplish-brown zone. With a hand lens or reading glass one should be able to see numerous point-like dots on the central area. These are the bodies that develop large numbers of spores of the parasite.

In our large rose garden, which is regularly dusted with sulphur to control black-spot, we now have the greatest difficulty in obtaining specimens of this disease, whereas originally it was very common and destructive.

Rose growers usually hesitate to cut out a cane of a climbing rose bearing a canker of this type, especially if it is going to bloom. Such a cane will die anyway and its destruction in time will save many other canes. Hybrid perpetuals are particularly subject to brown canker. In every case infected canes should be cut out and burned.

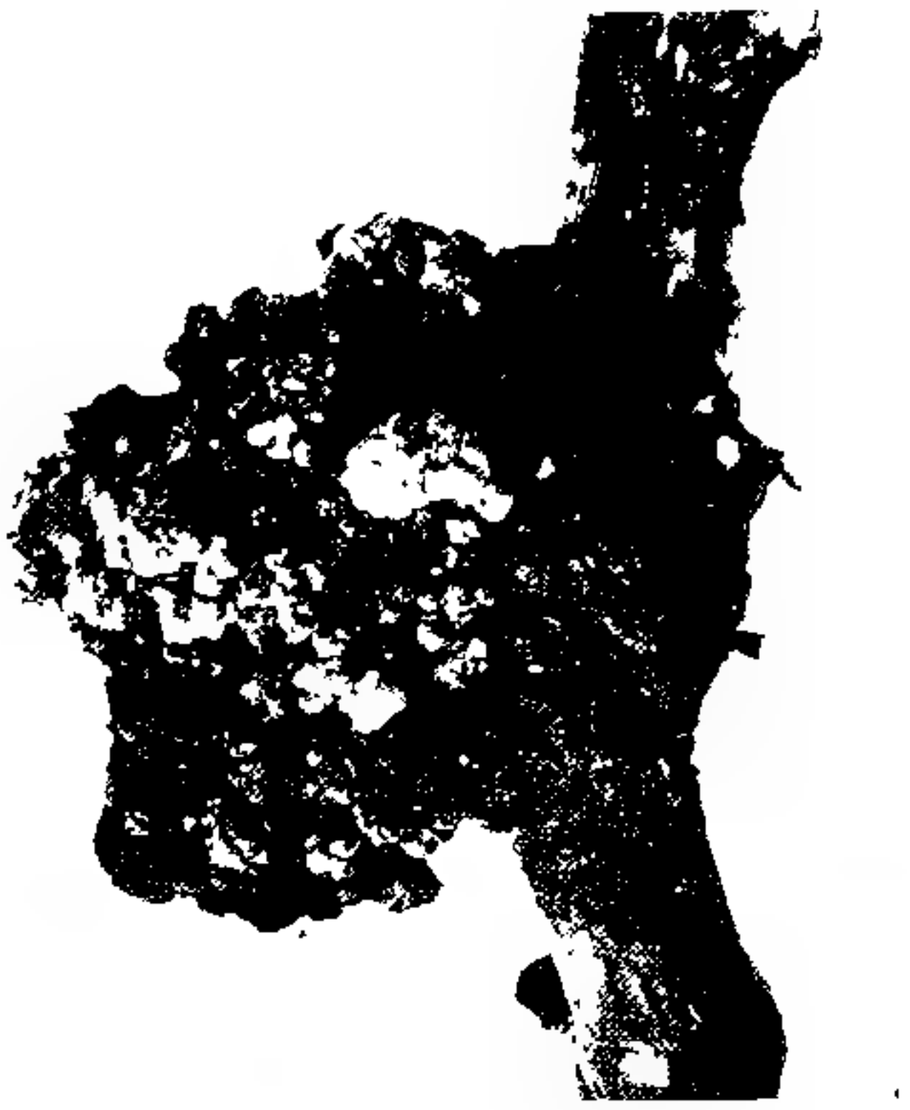

Fig. 5. *Crown gall on Hybrid Tea rose.*

Crown Gall

Though crown gall (Fig. 5) is not ordinarily very troublesome in rose gardens, whenever it is found infected plants should be destroyed. In serious cases the soil may be sterilized with formalin and allowed to remain a week or two before planting new roses.

Virus Diseases

In recent years, certain cases of virus diseases of roses have been reported in the East. Several years ago two plants of the bush rose ***Conrad F. Meyer*** in our garden began to show a mottling or mosaic type of leaf discoloration. Cutting out of the infected canes did not prevent the development of the disease on new canes springing up from the base. Originally the plant was in a vigorous condition and about eight feet high. Fewer blooms and less growth developed each year following. The ailing plant has now been cut back almost to the ground. A few hybrid tea roses in the same garden showing the same type of mottling or mosaic were destroyed. Mosaic diseases of roses have not yet been reported as at all serious in the East, but rose growers should inspect their plants with a view to destroying plants that appear to be infected with a virus.

* The figures stand for 4 pounds bluestone (copper sulphate), 4 pounds hydrated lime, and 50 gallons of water.

Aphids

Aphids usually appear on roses with the earliest flower buds. The flower stalks and underside of the leaves become infested very early. There are a number of contact spray compounds on the market. We have always found that 40 percent nicotine sulphate, Black Leaf 40 and other tobacco compounds are very effective, although certain pyrethrum and derris products are less objectionable as far as applications are concerned. Nicotine dusts are effective but rather expensive. We use Black Leaf 40, one pint to 100 gallons of water to which 4 or 5 pounds of fish-oil soap have been added. For small quantities use about 1½ teaspoonfuls of Black Leaf 40 and one cubic inch or one ounce of any good laundry soap to a gallon of water. In every case the soap should be *thoroughly dissolved in hot water* before adding to the mixture. In spraying for control of aphids and other sucking insects, it is highly important to cover the underside of the leaves, as this is where most of the insects feed. Usually two applications at an interval of one week will be sufficient for the first infestation. Later in July or August, it may be necessary to repeat the spraying because of new infestations.

Leaf-hopper

In our rose garden there are usually two infestations by leaf-hoppers. The first occurs in the latter part of May or early part of June, and the second sometime in August. Thorough spraying of the undersides of the leaves with a strong contact spray, repeated after a few days, will kill the young leaf-hoppers. If spraying is delayed until the insects have matured, control by contact sprays is very difficult.

Rose Chafer

While arsenate of lead, 2 to 4 level tablespoonfuls to a gallon of water, is usually recommended for spraying plants infested with leaf-eating insects, experience has shown that the treatment is not very effective in killing the rose chafer and the Japanese beetle. For Hybrid Tea roses in full bloom it is obviously inadvisable to spray the plant with arsenate of lead because of the unsightly spotting of the foliage. The period in which the rose chafer does its damage is very short and the most practical method of controlling these insects is to knock them off bushes into a can of kerosene.

Japanese Beetle

The most satisfactory method yet proposed for saving Hybrid Tea roses in bloom during the latter weeks of June, July and August is hand-picking of the beetles which gather in the blooms. In this way many blooms are rescued and the foliage is not made unsightly by poisons or repellents. In the case of bush roses and climbers, the Japanese beetle is most destructive after the blooming season is over. Severe foliage damage may follow if the plants are not sprayed with arsenate of lead or with a repellent preparation composed of 4 pounds of hydrated lime and 1 pound of aluminum sulphate to 20 gallons of water. This should be applied as soon as the first beetles appear and it should be repeated as often as necessary should heavy rains wash the material from the leaves. This mixture acts as a very good repellent and, while the foliage is badly discolored, the beetles are prevented from destroying the leaves altogether.

Derris and cubé extracts with a 4 percent rotenone content applied in a rosin residue emulsion every few days are said to lessen the damage done to flowers when in bloom by acting not only as a stomach poison but also as a repellent. The formula is ½ ounce derris powder, ½ ounce rosin residue emulsion, and 1 gallon of water.

If the lawns and other grass plots in the vicinity of gardens are protected against the larvae or grubs of the Japanese beetle, naturally the number of adults that affect the rose blooms will be lessened. This has been observed in our own rose garden where treatment of all grass plots with 10 pounds of arsenate of lead per 1,000 square feet has not only prevented the destruction of the lawns but has served to lessen the number of adult beetles to be combatted. The arsenate can be applied either in the powdered form mixed with good dry soil, or it can be applied as a spray. The time of year of the application is immaterial as long as the ground is not frozen. This treatment will be effective for at least five years.

Where the sulphur dust applied in the control of fungous diseases contains 10 per cent arsenate of lead, the soil in the

rose beds will eventually be impregnated with sufficient arsenate of lead to prevent larvae from feeding on the roots of the roses. As a rule, however, the adult beetles lay their eggs in lawns.

Other Chewing Insects

If a sulphur dust to which has been added 10 per cent arsenate of lead is regularly applied to roses in the control of black-spot, there will be little trouble from caterpillars and other leaf eating insects. If found necessary to apply the arsenate separately as for the web-worm on roses, use 2 or 3 level tablespoonfuls to a gallon of water, adding a spoonful of fish oil or linseed oil; or a tablespoonful of wheat flour, or some casein spreader will insure a more even distribution of the arsenate and make it stick better. For larger quantities use about 4 pounds of the arsenate to 100 gallons of water and add one pint of fish oil, or some other spreader.

Miscellaneous Diseases and Pests

Anthracnose, rust, various leaf-spots, cankers and other fungous diseases are sometimes reported as destructive to roses, but where black-spot and mildew are controlled, they are not apt to be troublesome. The spiral girdler cane-borer infrequently attacks *Rosa Hugonis*, and other cane-borers (Fig. 6) may infest canes of Hybrid Perpetuals to cause a wilting of the upper leaves early in summer. Occasionally Hybrid Tea roses are attacked by a borer which enters the cane near the base of a leaf and bores upward and emerges at the cut end. Naturally such infested canes should be cut out and destroyed. Red spider, always present in a garden, is more or less controlled incidentally by the sulphur dust used against black-spot.

The oystershell scale insect and the rose scale are more likely to attack neglected rose bushes. The old canes of varieties of the ***Dorothy Perkins*** type are ordinarily cut out each year after the blooming season to make room for the new growth This practice automatically serves largely to control scale. Other climbing and bush roses that do not send up much new growth each year are more subject to scale. One dormant application of lime sulphur as strong as 1:9 may be necessary.

Equipment

A one-quart brass or copper atomizer is one of the most useful pieces of equipment, whether one has a small home garden or a large estate. It is handy for spraying a few small plants, or for trying various new fungicides or insecticides in an experimental way. A preliminary trial on a small scale will often serve to avoid a lot of damage from improperly prepared spray compounds.

Most home gardeners acquire a 2- or 4-gallon brass pressure sprayer. Some prefer a 3 gallon knapsack sprayer. In either case the sprayer should have a cut off spring valve attachment with extension rods 3 or 4 feet long. Angle nozzles are also essential.

For the large garden or estate, the 10-gallon hand pump spray outfit would be desirable. There are also now on the market 50-gallon power sprayers, equipped with two rubber tired wheels. These can be moved about in a small space by one person. A gasoline engine provides up to 300 pounds or more pressure.

A one-pint or one-quart hand duster, operated by a piston compressor, is more

Fig. 6. *Rose cane-borer in a Hybrid Perpetual.*

reliable than the bellows types; at least it is more easily repaired.

A larger duster holding 5 or 10 pounds of sulphur would be desirable for larger gardens. The fan blower is operated by turning a crank. Such a type is very good for dusting Hybrid Teas and low bush roses. The piston type of duster is better for high pole roses.

Equipment commonly lacking but very essential would include: measuring spoons, pint, quart, and gallon measures, and spring scales, one graduated to weigh a few ounces, another to weigh a few pounds.

Where one uses the 50-gallon power sprayer capable of developing a pressure of 300 or 400 pounds, this pressure should be cut down very much for spraying Hybrid Tea roses. Damage can be done to tender leaves by too forceful spraying, as is the case with many garden plants. A pressure of from 50 to 100 pounds ought to be sufficient, and that is more than is obtained when one uses the ordinary hand pump pressure sprayer.

The possession and use of the right equipment for applying sprays and dusts is half the battle in combatting diseases and pests of roses.

William Herbert Medal Awarded to Dr. Stout

The American Amaryllis Society has announced the awarding of one of the William Herbert medals for 1939 to Dr. A. B. Stout, in recognition of his "outstanding work in breeding, cytology, genetics, introduction of new wild types and production of fine horticultural varieties" of the daylily (*Hemerocallis*).

The medal shows a portrait of Dean William Herbert (1778-1847), who in 1837 published his great work on the Amaryllidaceae—a study which remains a source-book for horticulturists and botanists in this field today. On the reverse of the medal a typical amaryllid has been sculptured in relief. It is *Hippeastrum vittatum*, taken from Leopold Trattinnick's "Thesaurus Botanicus" (1819).

Established by the American Amaryllis Society in 1936, the medal was first awarded to Arthington Worsley of England, designated as the "dean of the amaryllid fraternity," in 1937. Awards were made in 1939 to Carl Purdy of Ukiah, Calif.; Fred H. Howard of Montebello, Calif.; J. Hutchinson of the Royal Botanic Gardens at Kew, England; and S. Percy-Lancaster of the Royal Agri-Horticultural Society at Calcutta, India, besides to Dr. Stout.

Winners in 1938 were Ernst H. Krelage, Cecil Houdyshel, Major Albert Pam, Pierre S. du Pont, and Jan de Graaff.

Only one award will be made annually after the present year, the society has announced.

Dr. Rickett Appointed New Staff Member

Dr. Harold William Rickett, Associate Professor of Botany at the University of Missouri, has been appointed Assistant Bibliographer at The New York Botanical Garden. He will assume his duties about July 1.

Born in England, Dr. Rickett took his university work at Wisconsin after studying at Harvard University. He has carried on research at the Royal Botanic Gardens at Kew. He received an A.B. in 1917; A.M. in 1920, and Ph.D. in 1922, serving as assistant in the botany department during his last three years at the University of Wisconsin. He was then appointed an instructor.

From 1924 to 1928, he was assistant professor of botany at the University of Missouri; since then he has been associate professor there. In 1937-38 he taught as visiting professor of botany at Reed College in Oregon.

Dr. Rickett has worked in plant morphology and taxonomy, and is the author of a number of papers, especially in the latter field.

His work at the Garden will consist in part of relieving Dr. H. A. Gleason and other staff members working on *North American Flora*.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Plant Chemistry for the Specialist

THE CHEMISTRY OF PLANT CONSTITUENTS. Ole Gisvold and Charles H Rogers. 309 pages, index. Burgess Publishing Co., Minneapolis, Minn. 1939 edition. $3.50.

This is an excellent book for the specialist, covering the carbohydrates, vegetable fats, plant and insect waxes, sterols, proteins, alkaloids, glycosides, anthocyanins and anthoxanthins, carotinoids, tannins, terpenes and oxygenated terpenes, vitamins, enzymes and products of fermentation. It is profusely illustrated with structural formulae of the important compounds, and the authors have made a special effort to present the information in concise yet detailed form; in some sections the literature through 1938 is included. Numerous references to the original literature add to the value of the book. An index of 13 pages to the compounds discussed is very useful.

Books of this type, summarizing and digesting the available information in an important though limited field, are of great assistance to the advanced student and investigator.

W. J. ROBBINS.

Biology for the Young In Words They Can Understand

ADVENTURES WITH LIVING THINGS. Elsbeth Kroeber and Walter H. Wolff, 798 pages, 503 figures, indexed. D. C. Heath & Company, New York, 1938. $1.96.

Recent studies in reading abilities have shown indisputable evidence that 30 per cent of the high school population has little or no comprehension of text-book materials.* High school text books offer to some students a maze of verbal complexity and difficulty which they never solve.

Elsbeth Kroeber and Walter H. Wolff, widely recognized as inspiring teachers and successful administrators, have collaborated in writing a text book of biology which provides a simple and easily traversed verbal bridge between student and subject. Teachers of biology who have had to forget universal truths, basic principles, desirable attitudes and habits of scientific thinking in an effort to overcome students' language handicaps, now have an invaluable tool in Adventures With Living Things.

No biology text book has been written that has succeeded so well in providing for the varying reading and intellectual abilities of our adolescents. Subject matter was carefully planned and arranged to provide increasingly higher levels of difficulty. Painstaking attention was given to coherent expression of ideas and connection of thought. Fresh illustrations of biological phenomena have been presented in the light of our most recent knowledge. By means of suggested activities, which are intimately correlated with the text, the book becomes a student's guide to an exciting variety of first-hand experiences with living things.

Part I, entitled Many Living Things of the World, includes a thorough survey of the plant and animal kingdoms, showing relationships between large groups of organisms, hence the need for classification; all this without having to wade through a welter of involved terminology.

Part II, How Plants and Animals Live, presents a study of the way in which plants and animals carry out their vital functions. Environmental relationships are stressed. A wealth of illustrations of adaptations of living things to their environments makes the reading matter more meaningful.

Part III presents The Great Generalizations of Biology: that there is unity in all living things; a balance of life on the planet; and constant change on the earth and among its inhabitants. All of these concepts, with a picture of the pos-

* English Monograph No. 6 of the National Council of Teachers of English. D. Appleton—Century.

sible future of mankind, are arrived at logically and by the most appropriate psychological procedure.

While the quantity of illustrations is unmatched, the quality is not uniformly good. Colored plates would have been a welcome addition. The reviewers feel that the subject matter dealing with Genetics, Selection and Breeding and Cellular Division might have had a fuller, more enriched presentation.

Nevertheless, for the elimination of language difficulty, for the skillful presentation of the subject matter of high school biology, for the consideration of social and economic factors that affect the boy and girl in a biological world, we feel that the book reaches a new height of achievement.

JEROME METZNER,
Bronx High School of Science;
ABRAHAM PENZER,
Stuyvesant High School.

Gardens To See in America

THE GARDENER'S TRAVEL BOOK. Edward I. Farrington, 390 pages, illustrated. Hale, Cushman & Flint, Boston, 1938. $2.50.

The idea behind The Gardener's Travel Book is definitely a good one. Nobody thought of it before, yet nothing has been needed more than a guide book for gardeners, and here we have a good start in the right direction. The information is arranged state by state, followed by the provinces of Canada and several appendices covering rose gardens; rock gardens; national, state, and city parks; arboretums and botanical gardens; and suggested reading. There are 124 excellent photographs, besides state and city maps.

The book seems to try to serve two purposes: first to be a guide book, and second to be good reading. This is an impossible combination for it results in a heavy bulky book of nearly 400 pages. Outline form with some system of marking the more important places will eventually have to be used, for everybody in the U. S. A. is going to write and tell Mr. Farrington what he has left out.

His first letter may well have been from Grover Whalen. The New York World's Fair is not mentioned. Californians have seen to it that their Golden Gate Exposition is included. Yet at the World's Fair there will be more landscaping than at any previous one, as the area is much larger. The main scheme has been designed by a central board which has passed on the design of each exhibitor. An entire section, "Gardens on Parade," is devoted to display gardens, flower shows, and other horticultural exhibits; Charles Downing Lay passes on the designs. After the Fair the whole 1,216 acres will become a public park.

More suggestions for the travel book are:

Hotel gardens of California.
Visiting days for Newport gardens.
Trees of Flushing, N. Y., especially the great weeping beech.
New York City, Long Island, and Westchester County open days for famous gardens. (Westchester is given under Yonkers.)
Yale, Princeton, Vassar, etc. campuses (Vassar appears in appendix), including the great perennial border at Vassar.
The Smith College Graduate School of Architecture and Landscape Architecture at Cambridge, Mass.
Narcissus fields, Babylon, L. I., N. Y.
Long Island parkways (partly in appendix and partly under Hicksville).
Library, herbarium, museum of The New York Botanical Garden.
State Institute of Agriculture, Farmingdale, L. I., N. Y.
More names of designers, as L'Enfant for Washington, D. C.
Duration of spring flower shows, dates when plantings have been made (as in arboretums), and definite directions as to how to reach the places mentioned.

Additional lists for special interests would be appreciated, such as garden theaters, herb gardens, trial grounds and gardens, etc. An index is needed.

There are a few strange passages which make one skeptical about the unfamiliar parts of the book. "Visitors to New York," it says, "will naturally spend much time in Central Park." Granted that they will, and I have my doubts, it might help them to tell where it is, who designed it, when, and what to look for besides general plantings and wisteria.

It took half a day to locate the Elgin Botanic Garden listed in the appendix as in New York City. At Rockefeller Center they say it lies between the two buildings on Fifth Avenue on the block from 49th to 50th Street and consists of pools and the planting around them. Or can Mr. Farrington mean the physicke garden that disappeared in 1811? Take your choice, depending upon whether you go to see it on Midsummer's Eve.

Also how sure are our welcomes in all these places?

There is little value in saying that "Mt. Vernon is one of the country's most in-

teresting spots" and the Arnold Arboretum "a point of horticultural interest which no gardener or tree lover should fail to see." Their inclusion in this book presupposes as much. The use of a blue pencil and some telescoping would soon reduce the book to guide-book size. It could then be slipped into one's pocket—and away we go! For though he may *garden* from an armchair, no seasoned gardener is ever going to do his traveling between the covers of a book.

MARY DIXON, M.L.A.,

Trees From Alaska To Oregon

FOREST TREES OF THE PACIFIC COAST. Willard Ayres Eliot. 565 pages, indexed and illustrated. Putnam, New York, 1938. $5.

Under the title "Forest Trees of the Pacific Coast" Willard Ayres Eliot, assisted by G. B. McLean, has given us a particularly interesting and helpful book upon the trees and larger shrubs native from Alaska to Oregon.

In the words of the author, this book has been written to meet the increasing demand for a popular field book to be used by amateurs, outdoor clubs, elementary forestry students, nature teachers, forest rangers, and all who have need or desire to learn what they see when they are outdoors in that highly interesting region. The book is the result of several years of extensive travel and study by the author and its primary purpose is to furnish a means of identifying the species described by the appearance of average mature leaves. This identification is greatly facilitated by the splendid photographs, mainly made by George H. Stephenson, which show the trees in their entirety in typical situations, and also by scale photographs and drawings of leaves, fruits and branches. More than 90 species are pictured in this helpful fashion.

The utmost care has been taken to combine the results of personal observation with the data carried in a long list of publications, botanical, Forest Service, and others, upon the same general subject, to which full credit is given.

For each of the species described in the book there are in carefully arranged paragraphs the latest accepted scientific names, notes as to former nomenclature, a list of common names, a detailed discussion of general and local ranges of distribution and habitat, descriptions of leaves, fruit and wood, and much general information upon the qualities and uses of the wood of the more important species and the part which each plays in the forest makeup.

"Forest Trees of the Pacific Coast" should be in the library of every person who is in any way interested in the diversified and abundant flora of the last virgin timber region of America.

ROYAL S. KELLOGG.

Grass Plants and Legumes

COMMON BRITISH GRASSES AND LEGUMES. J. O. Thomas and L. J. Davies. 124 pages, indexed, illustrated. Longmans-Green, New York, 1938. $2.20.

This book, as indicated by the title, deals with the species which are used widely in the British Isles. The value will not be limited, however, to the British Isles, since more than half of the species described are used extensively in agriculture and on recreational turfed areas in the United States. The book is unique in providing accurate detailed sketches of vegetative organs, seeds and fruits as well as floral organs. The sketches alone will prove invaluable to persons having an interest in the species in question. Forty-nine common grasses are covered in the key on this group, and 26 are described in detail. Of these, 15 are well known grasses used for hay, pasture and lawns in the United States. Of particular interest to those living on the Atlantic seaboard are the descriptions and sketches of the beach grasses which are so valuable in stabilizing seacoast areas.

Eighteen legumes are covered in the key on this group, 16 of which are described in detail. Eight of these are grown very widely in the United States for agricultural purposes. As in the case of the grasses, the sketches are helpful in obtaining a true picture of the habits of the plant.

H. B. SPRAGUE,

New Jersey State College of Agriculture.

Notes, News, and Comment

In Washington. At the meeting of the National Academy of Sciences in Washington April 26, Dr. B. O. Dodge spoke on a new dominant lethal in *Neurospora* which effects ascus abortion and otherwise causes abnormality in the mechanism of spore formation in the ascus.

On the same day, Dr. William J. Robbins addressed the Plant Pathology Seminar in Washington on growth substances in relation to fungi.

From Italy. Eight representatives of the Italian Horticultural Society, who had come to New York to attend the World's Fair, visited The New York Botanical Garden May 1.

Garden Clubs. Mrs. Mortimer J. Fox, who is a member of the Corporation and the Advisory Council of The New York Botanical Garden, brought 40 members of the Garden Clubs of Peekskill, Yorktown Heights, and Mahopac to the Garden the afternoon of May 4.

Thirty members of the Garden Club of Dobbs Ferry visited the Thompson Memorial Rock Garden May 2. The Sub-Deb group of the Garden Club of Larchmont made a tour of the Garden April 13.

Student Visitors. Ten horticultural students from New Brunswick, N. J., under the direction of Prof. J. Harold Clark of the Agricultural Experiment Station there, spent the morning of May 12 at the Botanical Garden, to learn about plant breeding being done here and to see the Thompson Memorial Rock Garden.

Dr. R. C. Benedict of Brooklyn College brought ten of his botany students to the Garden on April 14.

Other group visitors during the past month, outside of those conducted by the W.P.A., have included a nature club, besides children from a Brooklyn school and a kindergarten in the Bronx.

Gardeners Forum. At the annual dinner of the Gardeners Forum April 30 at the Beekman Tower Hotel, Samuel Bridge was awarded a set of Britton & Brown's Illustrated Flora for having made the finest herbarium collection of local plants among student gardeners during the past year. T. H. Everett was toastmaster and addresses were given by Fred Sparks, John Watts, and Edwin Beckett, who are all head gardeners on large estates around New York. Elizabeth C. Hall also spoke, and short talks were given by Joseph Elliott and Philip Chandler, exchange student gardeners from Scotland and England, and Samuel Bridge, who will go to England for a year in July.

Student Gardeners. Fraser MacCartney, who has spent the past year as exchange student gardener at Kew, has accepted a position in Istanbul, Turkey.

George Lupton, who became outside foreman on the S. Z. Mitchell estate after completing his student gardener training at the Botanical Garden, has been appointed greenhouse foreman on the estate of Mrs. J. B. Schlotman at Grosse Point Shores, Detroit.

Visitors. Among the botanists who have recently registered in the library are M. A Chrysler of New Brunswick, N. J.; F. A. Varrelman, Chicago; M. K. Elias, Yale University; F. R. Fosberg, University of Pennsylvania; A. Fredholm, Jacksonville, Fla.; Liang Hwang, Liuchow, China; C. Weatherby, Cambridge, England; Joseph H. Pyron, Athens, Ga.; and Edgar T. Wherry, University of Pennsylvania.

Address. Dr. William J. Robbins spoke at the 23rd annual meeting of the New York State Association of Public Health Laboratories on May 8 at Grasslands Hospital, Valhalla, N. Y.

Tulip Day. Dr. W. H. Camp represented The New York Botanical Garden at the annual Tulip Festival at Tudor City May 16, speaking on the history of the tulip.

Birthday. The 80th birthday anniversary of Robert S. Williams, Research Associate in Bryology at the Botanical Garden, was observed a day in advance, May 5, by members of the staff who gathered in the Director's office. Among others to congratulate him during the day was Mrs. Theron G. Strong, 88. Mr. Williams has been associated with the Garden since December 1899.

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The New York Botanical Garden was incorporated by a special act of the Legislature of the State of New York in 1891. The Act of Incorporation provides, among other things, for a self-perpetuating body of incorporators, who meet annually to elect members of the Board of Managers. They also elect new members of their own body, the present roster of which is given below.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

July, 1939

WEEPING HEMLOCK IN FRONT OF THE MUSEUM BUILDING
Cover Photograph by Fleda Griffith

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"FOR BEAUTY AND FOR SERVICE"

In speaking of the often quoted purposes for which The New York Botanical Garden was incorporated, President Swan said to the audience gathered for the dedication of the plaque in honor of L. C. Bobbink on June 6:

"This is a fine objective toward which, during the past almost fifty years, the Garden has constantly set its aim. . Its grounds, greenhouses and plantings you see about you. Each year they develop and improve. Its herbarium of nearly two million specimens increases at the rate of nearly forty thousand a year. Its library is one of the finest in America. . Its research work is of major importance as are its publications. All of these activities are carried on with modest means and are capable of great development and much greater usefulness.

"We have many friends who give much of time and effort on our behalf. We want more. We want all of you and all of your friends as our friends, to help us develop the great potentialities for beauty and for service which are here at hand."

Mr. Bobbink's part in the building up of the rose garden is one illustration of an act of consummate friendship for the institution. The gracious appearance of Pearl Buck on the platform to speak about roses and to unveil the plaque is another sign of the high esteem in which the Garden is held by those who are acquainted with it. The presentation of valuable books, herbarium collections, rare and unusual living plants, are other friendly acts which the Garden cherishes as it does the objects given. Time and advice of experts in fields outside the Garden's immediate scope are similarly appreciated. Gifts of money go far in increasing the usefulness of the Botanical Garden to the public and to science.

Without friendship such as this, the Garden would be unable to function according to its pledge of half a century ago. It behooves every person who now regards the institution with friendly interest to find new friends to add to the great circle of those who are already promoting these "great potentialities for beauty and for service which are here at hand."

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Pearl Buck Unveils Bronze Tablet Dedicated To L. C. Bobbink

Ceremony is Focal Point Of Two-Day Conference on Roses

IN appreciation for the gift of many thousands of plants presented during the past sixteen years, and for the wise counsel that has fostered the collection and display of outdoor roses at The New York Botanical Garden, a bronze plaque was dedicated by the institution the afternoon of June 6 to honor Lambertus C. Bobbink.

Pearl S. Buck, author of "The Good Earth," "Sons," and other works and 1938 Nobel prize winner, unveiled the tablet after giving an informal address.

"I am here because of my gratitude for roses," she said in opening. "When so many speeches must be made today for many causes—Spanish

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The rose garden on the day of the dedication and conference.

and German refugees, starving Chinese babies, and other unpleasant aspects of life in a warring world, it is a joyous thing to be able to speak about roses." Continuing, she told of her long association with roses, saying, in substance:

Pearl Buck

I know that the rose is my own favorite flower, for all my life roses have been with me wherever I have been. Even now, some of Mr. Bobbink's roses are blooming in my garden in Pennsylvania.

I have found that roses will grow almost anywhere, sometimes under the most trying circumstances. And wherever they are, they always give joy. For that reason I never feel badly when a rosebush is taken away, for I know that in its new home it will bring pleasure to someone else.

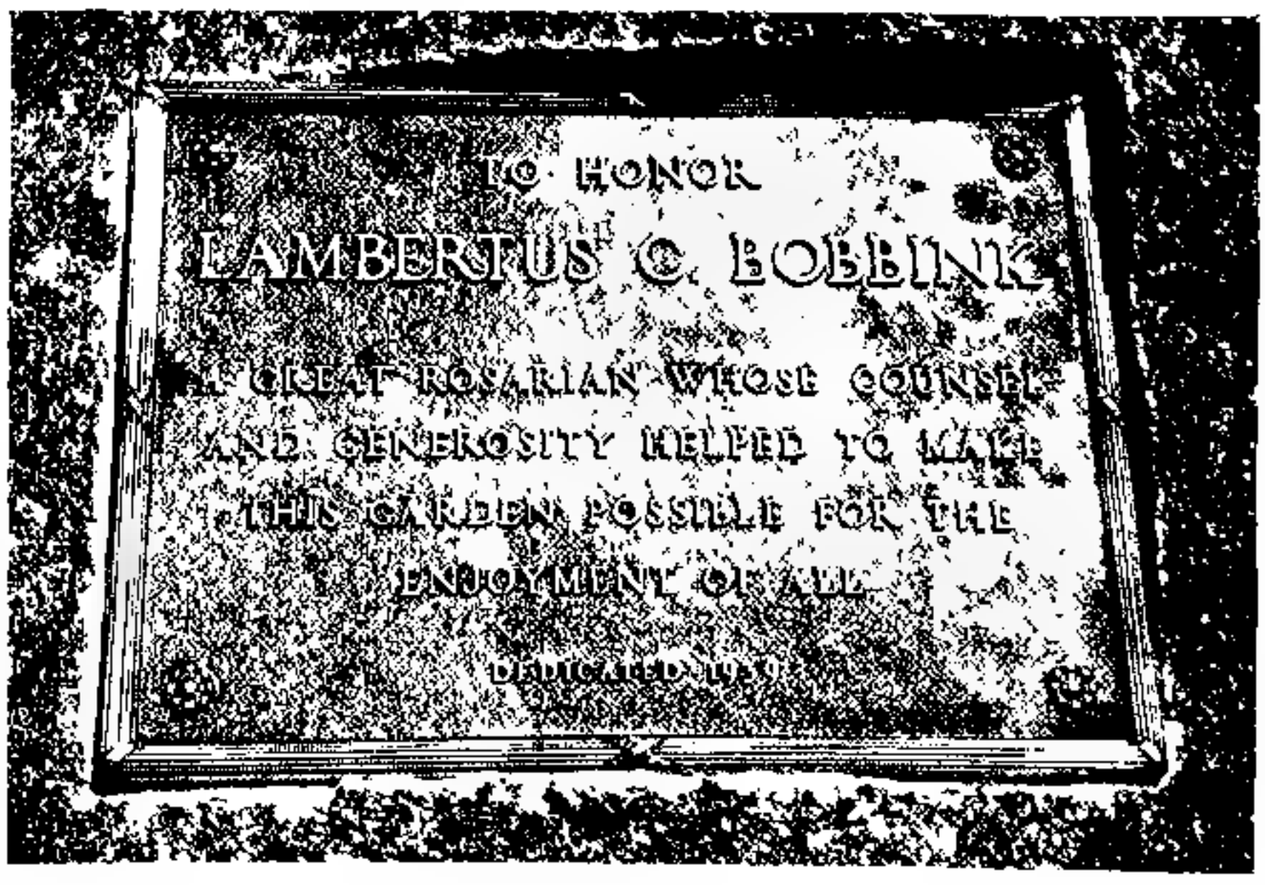
The sight of these roses here recalls a rosebush of my childhood, beside an old wall in China; then another beside the rushing yellow waters of the Yangtze River at Shanghai. I seem to have grown up under a great bush of fragrant roses—probably Banksiae. . . Then in 1911 came the revolution, and still there were roses everywhere, all through the war. A rose garden was something to go into to forget.

We moved to the north of China, and there in the dry and dreary soil we found Chinese roses to grow in this most difficult place. Upon our return we found, in the midst of the devastation, that the roses had pulled through and were blooming still for us after two years of war and neglect.

Roses take the mind away from trouble and useless frets . .

I am glad to give a tribute to one who has given his life to roses. Work like this is as important as the making of music and poetry, art, and sculpture in a world that needs and admires these things of beauty.

A large bouquet of roses, especially prepared by Max Schling, was presented to Miss Buck at the end of her address by Margaret Divers, five-year-old daughter of John Divers of the gardening staff.



The Plaque

Joseph R. Swan, the Garden's President, directed the ceremonies, and Charles Totty, long a friend of Mr. Bobbink's, spoke briefly on the guest of honor's prowess as an all-around plantsman—"a horticulturist of the first water," he called him. Before the program and afterward, while the guests inspected the rose garden, the City's Park Department Band played from just outside the garden.

This ceremony served as a focal point around which was built a conference on roses which brought to the Garden representatives of nurseries, Agricultural Experiment Stations, colleges, schools, horticultural societies, and garden clubs, as well as many private large-scale growers and home gardeners. About 300 people, including those who came both days, attended the sessions on Tuesday and Wednesday, June 6 and 7.

The Proceedings of the Rose Conference, including the complete address of Miss Buck, will be published by the Science Press, according to plans now under way.

A feature of the program which brought enthusiastic applause during the first morning session was a description of "My Favorite Rose" by representatives of five major organizations concerned with horticulture. The favorite roses and the women who chose them were:

Mrs. Charles Bell, Mrs. Charles Doscher, Federated Garden Club of New York State; ***Maiden's Blush***, Mrs. Robert C. Hill, City Gardens Club; ***Gruss an Aachen***, Mrs. Francis King, Garden Club of America; ***Premier***, Mrs. H. Edward Manville, International Garden Club; ***Moss***, Miss Elizabeth Remsen Van Brunt, Woman's

Mr. Bobbink and Miss Buck with the plaque which was dedicated June 6. Photograph by courtesy of the Flower Grower Magazine.

Auxiliary of the Brooklyn Botanic Garden; ***Silver Moon***, Mrs George W. Perkins, Advisory Council of The New York Botanical Garden.

Dr. L. O. Kunkel, who came to New York from Princeton for the conference, was asked to speak on Friday afternoon on virus diseases of roses. Part of the demonstration which accompanied the rose clinic at the close of the session on Friday consisted of enlarged sketches in watercolor showing diseases and pests of roses, contributed by Dr. Cynthia Westcott; representations of anthracnose and cankers on roses by Dr. Anna Jenkins; spraying and dusting equipment displayed by Peter Henderson & Company, and examples of rose diseases and pests and the means of controlling them, arranged by Dr. B. O Dodge.

Japanese Beetle Time Is Here Again

And All Must Co-operate If the Pest is to be Controlled

INFORMATION as to the ways of controlling the Japanese beetle will soon be in great demand. We are therefore availing ourselves of the opportunity to distribute through this Journal the accompanying illustration of the life history of the insect, obtained through the courtesy of the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture. On the reverse side will be found information as to the most practical methods of control that have so far been worked out in this country.

No mention is made on the leaflet of the use of traps which have been baited with geraniol because, unless people co-operate, the smell of the geraniol will draw more beetles from one's neighbors' gardens than will be caught in the traps. With neighborly co-operation, however, trapping would certainly be helpful.

Natural enemies of this insect, such as species of eelworms and the parasitic Tiphia wasps, are being colonized by Federal investigators. Such methods of extermination, known as "biological control," are proving helpful, but as yet makeshift methods must be used. For the small home garden many blooms can be saved by knocking the beetles off into a can of kerosene. Protecting the lawns as suggested on the leaflet proves beneficial to the flower garden because, by killing the grubs which otherwise, as beetles, would become leaf and flower feeders, much later destruction is prevented.

At the Garden we have tried out the four methods of control listed on the back of the illustration and have found them all helpful, though the Japanese beetles are by no means yet eliminated. Much work remains to be done.

Certain products containing pyrethrum and derris now being advertised as effective contact sprays merely stun the beetles for a time without killing them. To make sure that *you* are using a really effective poison, you may try out such products by confining the sprayed beetles under a jar for a few hours.

If everyone does his utmost, using proven methods against the Japanese beetles in July and August each year, there is hope that someday this worst-of-all garden pest will be controlled if not exterminated.

B. O. Dodge.

JAPANESE BEETLE

Adult beetles feeding on fruit and leaves, about one-half natural size. Insert, adult beetle, about twice natural size. Figures below ground represent seasonal history of the Japanese beetle. Left to right, mature grub (late spring); pupa; beetle laying eggs (summer); developing grubs (late summer and fall); all about twice natural size.

(See other side for life history and control)

Bureau of Entomology and Plant Quarantine
United States Department of Agriculture

Picture Sheet No. 4

JAPANESE BEETLE

(*Popillia japonica* Newman)

Life History

Japanese beetles overwinter as grubs, or larvae, in the soil at depths of 2 to 6 inches. During April they move nearer the surface and feed on the roots of plants. Early in June the grubs stop feeding, pass through a transformation stage, and then become the adult beetles. By early July the beetles are present in numbers, flying about and feeding extensively on the foliage, fruit, and blossoms of many trees and plants. During July and August the females go into the ground and deposit eggs; these hatch into small grubs, which feed on roots of grass and other plants. By fall these larvae are mostly full grown; as winter approaches they move deeper into the soil. Grubs are more abundant in turf than in other situations and cause serious injury to lawns.

Control of the Beetle

Protective or repellent sprays.—The foliage of fruit, shade, and ornamental trees and shrubs can be protected from beetle attack by the use of protective or repellent sprays. These should be applied when the beetles first appear, and additional applications should be made as needed to maintain a protective coating on all portions of the plant subject to attack as long as the beetles are present. The most useful sprays are as follows:

1. Powdered lead arsenate, 10 ounces; wheat flour, 6 ounces; water, 10 gallons (for ornamental trees and shrubs).
2. Powdered lead arsenate, 10 ounces; light-pressed fish oil, 2½ ounces; water, 10 gallons (for ornamental trees and shrubs).
3. Aluminum sulphate, ½ pound; hydrated lime, 2 pounds; water, 10 gallons (for ornamental trees and shrubs, bearing apple, plum, and cherry trees, grapevines, small fruits, and flowering plants).
4. Powdered derris (4 percent rotenone), 5½ ounces; water, 10 gallons (for bearing apple, plum, cherry, and peach trees, bearing grapes and small fruits, and flowering plants).

Contact sprays.—Contact sprays are of value in killing beetles if care is taken to actually hit them with the liquid, but they may not afford satisfactory protection of foliage. The contact sprays include: Spray 4, listed above; commercial fish-oil soap or a good grade of household soap, 3 pounds to 10 gallons of water; and the commercial pyrethrum sprays, at rates recommended by the manufacturers.

Control of Grubs

Lawns can be protected from injury by Japanese beetle grubs for a 5-year period by making one application of lead arsenate at the rate of 10 pounds per 1,000 square feet of lawn. The poison should be mixed with 25 times its volume of moist sand, soil, or other suitable material, and broadcast by hand.

Cautions in the Use of Lead Arsenate

Lead arsenate is poisonous to man and animals, and children or animals should not be allowed access to it. Great care should be taken to avoid getting lead arsenate into the mouth or into cuts or abrasions of the skin. Grass should be washed thoroughly with a hose, after the treatment is applied, to remove any poisonous residue. Domestic animals should not be allowed to feed on treated grass or on or under sprayed trees or shrubbery while any poisonous residue is visible.

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Weeping Or Pendulous Hemlocks

Some Notes on Their History, Propagation, And Peculiar Habit of Branching

By A. B. Stout

For three-quarters of a century, since the first weeping hemlocks were discovered near the village of Fishkill, N. Y., just east of the Hudson River, there has been considerable interest in this decorative form of Tsuga canadensis. *What causes the pendulous effect? Can it be transmitted by seed, or must the trees be propagated vegetatively in order to reproduce their own kind? What is the history of the principal specimens which are known both in the wild and in cultivation today?*

Dr. Stout has been studying this form of the hemlock for nearly a quarter of a century. Recently he found in the wild what appears to be the largest specimen of a pendulous hemlock in existence anywhere. Here he records his observations of this, which he calls the **Horton** *hemlock, and of others, some of which he has raised himself from seed.* C. H. W.

WHILE most of the weeping hemlocks of the Sargent type known today have been derived from a few plants discovered probably in the 1860's, the largest and presumably the oldest specimen of this type (*Tsuga canadensis* var. *pendula*) is a tree that stands in stately splendor in its original wild location on the mountainside overlooking the hamlet of Hortontown, close to the northern border of Putnam County, N. Y.

The Horton Hemlock Tree

Designated here as the ***Horton*** hemlock, this great tree has long been known to persons who reside in the vicinity. Mr. Joseph Horton, now the owner of the land on which it stands, states that he has known it since 65 years ago and that it was then at least one half as large as it is now. Apparently this tree has not been mentioned in horticultural or botanical literature until the present writing. My first knowledge of this tree was during 1937 when it came into view as I passed by auto along the newly constructed Eastern State Parkway.

This tree is about 16 feet in vertical height measuring from the ground at the side of the trunk but it stands on sloping ground and the projected vertical height from the tips of the lowermost branches to the level of the highest point of the top is perhaps 20 feet. The trunk is 4 feet 10 inches in circumference at a height of 4½ feet. At first it is somewhat leaning,

then is sharply bent at a divergent angle above which it soon breaks into two large-sized divergent units in each of which there is the further branching characteristic of the variety *pendula*. (See Figures 4 and 5.) The present branches begin at 5 feet, but below this and close to the base there is a noticeable scar where a branch of some size was long ago shed or removed. At the first sharp bend in the main axis several branches of some size have died, one of which was probably a terminal. In the view shown in Figure 6 the top of this tree is a flattened dome but at right angles to this view the top is noticeably depressed in the middle.

This tree produces cones in considerable number but it stands close to a dwelling and evidently there has been little chance for seedlings to develop and survive. At any rate, only two seedlings have recently grown to noticeable size in the immediate vicinity. Mr. Horton states that one of these, which was pendulous, was transplated about five years ago when it was several feet tall, and that it died soon after. A second seedling now about 7 feet tall seems to have the habit of growth that is normal for hemlocks. Another young hemlock tree in the yard is a normal wild seedling transplanted from some distance away. No other hemlocks are now growing nearby but scattering trees are in view on the surrounding hillsides. Hemlock trees were once abundant in the region but were mostly cut both for lumber and for the bark which was of commercial value in the tanning industry.

The Fishkill Seedlings of *Tsuga canadensis* var. *pendula*

The "discovery" of four wild plants, evidently the *first* to be known of the "*pendula*" form of the Canadian hemlock, has been credited to General Joseph Howland. The precise facts regarding who first observed and recognized the pendulous character of these trees, the locations where they grew, how large they were at the time, and when they were transplanted from the wild were evidently not recorded in publications of that time. It was stated in 1897* that "several of these plants were originally found together about forty years ago on the Fishkill Mountains in New York." But Mr. Charles F. Jenkins** reports that another memorandum made by Prof. Charles S. Sargent states that the date when these seedlings were found was between 1865 and 1870. It is to be noted that the ***Horton*** hemlock tree stands only about five miles in a direct line from the village of Fishkill. The further history and present condition of these four individual plants may be summarized as follows:

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* Charles S. Sargent. Notes on Cultivated Conifers. —XI. Garden and Forest. **10**: 490-491. 1897.

** Charles F. Jenkins. Sargent's Weeping Hemlock. The Hemlock Arboretum Bulletin No. 4, 1933.

The Tioronda Hemlock. One of the four wild plants was transplanted to the country estate (named Tioronda) of General Joseph Howland near Beacon, New York. This property is now owned by the Tioronda Company and is the location of the Craig House Sanitarium. This plant is still alive and thriving. It is now about 11 feet in greatest height and about 35 feet in greatest spread. As shown in Figure 9, the trunk is much-branched and wide-spreading. The dome of foliage is relatively low and flat. There are four large, main, much-crooked and angled trunk-like branches which arise from below the present level of the ground and are entirely separated at that level but which are soon divided. Many side branches, some of several inches diameter, have died and been removed. This plant now stands close to a large normal hemlock which shades and partly overtops it and hence there is abundant opportunity for cross-pollination in the production of its cones and seeds.

The Wodenethe and Hunnewell Hemlocks. One of the original wild seedlings was transplanted to the country home (called Wodenethe) of Henry Winthrop Sargent, which was near the present town of Beacon, N. Y., and another was taken to the estate of H. H. Hunnewell at Wellesley, Mass. The death of these two trees was recorded in 1923 by an unnamed writer in the Gardeners' Chronicle (London). There appear to be no data on the precise character and size of these two trees other than that they had a pendulous form and there is no specific record regarding propagations from these two individuals.

The Holm Lea Hemlock. One of the four wild seedlings found near Fishkill was transplanted to the estate (Holm Lea) of the late Professor Charles S. Sargent at Brookline, Massachusetts. At the present time this plant is about 7 feet tall at its highest point and the greatest width is about 27 feet. The form, shown in Figure 1, is widely spreading and low-branched and very similar to the ***Tioronda*** hemlock, but the lowermost outer branches are retained and sweep to the ground.

The Habit of Growth in These Pendulous Hemlocks

In the "normal" growth of plants of the Canadian hemlock (*Tsuga canadensis*), the main or terminal bud of the young plant continually maintains the lead over its laterals and a trunk develops that is erect and dominant, making the frame noticeably of the excurrent type. Frequently, however, trees will have in the main framework two or more units beginning at various levels, in each of which the branching is excurrent.

Several aspects of growth among the lateral branches of hemlocks combine to give unusual beauty and grace to the system of branching. The tips of branches are weak and drooping and the laterals on the primary lateral branches are noticeably flattened into two ranks. Thus, although the primary framework is excurrent with the primary laterals radially disposed, the secondary lines are feathery and drooping.

In plants of the pendulous Sargent hemlock a single main axis and terminal are not present. The framework, in contrast to the excurrent form of the normal hemlock tree, is deliquescent, or much branched, and essentially that of a bush, and the drooping branches are rather closely overlapping so that they combine to form a dome, the outermost lower fringes of which reach to the ground in a nearly circular outline. In respect to the form and character of the base of the main framework two types are to be recognized: (1) the shrub form and (2) the standard form.

(1) The ***shrub*** form has a low-branching framework with two or more divergent units of the stem which arise close to the ground or, in some transplanted plants, from below the level of the ground. (See Figure 2.) The development of a plant with this habit and form is as follows:

Two seedlings at the South Wilton Nurseries, showing difference in stature at the same age. Between them stands W. A. Van Heiningen, son of J. C. Van Heiningen, owner of the nurseries.

The initial stem or main axis of a seedling, a grafted scion, or a cutting does not become erect but instead it leans decidedly from the upright position. Soon a lateral develops in a divergent direction to form a fork and then others arise to give to the top a more expanded outline. In the growth of the successive branches some laterals arise either directly above their own terminals or in divergent and diverse directions. Also various of the ascending laterals become dominant in vigor of growth to a degree that shifts the direction of greatest diameter-growth from a terminal to one of its laterals. A lateral which is divergent may become nearly equal in growth with its terminal and thus form a fork as in Figure 8; or two laterals that are nearly opposite may develop to almost the same extent. Thus the stem-units become rather sharply bent and frequently forked. The habit of growth in these pendulous hemlocks is well shown in Figure 11, in which the bark has been whitened in order to show the direction of the branches. This is of a seedling that has been under observation during a period of 23 years. The branches were parted for this photograph in a way which shows the several features of special growth: (*a*) no branches are erect; (*b*) the terminals are successively overtopped by some of their own laterals; (*c*) the axis of greatest growth is diverted to the laterals; and (*d*) the laterals are so divergent that they fill in and round out the dome of foliage within the circumference of the outermost reaches.

Beneath and within the canopy of dense foliage that arises, the death of many shaded branches of various sizes occurs and in time many of these are naturally shed. In some cases the death of lower branches may be so general and complete that the green foliage does not reach to the ground. This condition is seen in the trees at Fairmount Park, Philadelphia (Figure 2), from which dead lower branches of as much as several inches in diameter have, from time to time, been removed by pruning. In large trees of this type the green foliage may reach to the ground, but one may walk about beneath the canopy of foliage in the space once occupied by branches.

So far as the writer has observed there is no sprouting of shoots from roots or from the base of older portions of the main trunk in any of these plants.

The shrub habit described above is characteristic (*a*) of the two which are still living of the four original pendulous plants first found; (*b*) of many, but not all, propagations that have been grown from their branches; and (*c*) of all but one of the known seedlings grown from the seeds of these plants.

(2) The ***standard*** form differs from that described above in that there is a main trunk of rather uniform diameter which rises to a height of several feet before it breaks into pendulous branches of considerable size. In such a development the lower lateral branches about the main axis are relatively small and are likely to die and be shed. The framework is hence decidedly umbrella-like.

The ***Horton*** hemlock tree has a high-branching framework but the trunk is not fully erect. It is angled and bent and near the base there is a scar of a lateral that has been lost. (Figure 5.) Conspicuous examples of the standard form exist in trees that are propagations, either of graftage or layering, from the original Fishkill seedlings. The tree shown in Fig. 3 is one of these. The standard form in grafted propagations may, it seems, be enforced by treatment in nursery practice when the main leader of a grafted plant is staked and tied in an upright position and the lower laterals are removed while they are small.

Propagations from the Fishkill Seedlings

Soon after the discovery of the first four wild plants of the Sargent hemlock, propagations were undertaken in the nursery of Parsons and Sons at Flushing, Long Island, and also by a Mr. Gaines who lived at Beacon, N. Y. It appears that the *first* mention in print of *any* of these weeping hemlocks refers to some of these propagations. This is the publication in 1875 of the following statement by the editor of an English journal, *The Garden* (in Vol. **8**, page 310):

"The Weeping Hemlock Spruce: Mr. Samuel Parsons writes to us from Flushing, Long Island, praising the beauty of the Weeping Hemlock (*Abies canadensis* var. *pendula*). The ordinary form of the Hemlock is a very graceful tree, and this one will prove a welcome addition to our pleasure grounds."

At this date the botanical distinction between the firs (the genus *Abies*) and the hemlocks (the genus *Tsuga*) had not been fully established. This publication applies the botanical name *pendula* to this type of pendulous hemlock as a *true*

varietal name. This name was accepted by Beissner (Handbuch der Nadelholzkunde, 1891). In both horticultural and botanical literature the common name "Sargent hemlock" has been applied to *all* the individuals which are to be included in *Tsuga canadensis* var. *pendula*. These designations are perhaps adequate unless clonal propagations from different individuals show noteworthy and distinguishing differences in habits of growth, in which case clonal names of horticultural significance will be desirable.

The first catalog listing of plants of these propagations was evidently by Parsons & Sons in 1879 and this is as follows:

"*Abies canadensis pendula sargenti*, Sargent's weeping hemlock, the most graceful and delicately beautiful evergreen known. When the leader is trained to a stake it can be carried to any reasonable height, each tier of branches drooping gracefully to the ground, like an evergreen fountain. It was first sent out from Flushing, having been received from H. W. Sargent, of Fishkill-on-Hudson."

Further mention of the methods employed in propagating these plants together with what seems to be the first illustration of a plant of these pendulous hemlocks appeared in 1887 (*The Garden* **32**: 363). The illustration is a wood-cut engraving made of a photograph sent by Samuel B. Parsons which shows a plant which was then growing in Mr. Parsons' nursery and which was, without a doubt, one of the earliest of the plants grown by graftage. This illustration clearly shows a plant with pendulous branches reaching to the ground, but the top is somewhat tall and rounded, as are other propagations now known, rather than broad and flat-topped as are the ***Tioronda*** and the ***Holm Lea*** specimens.

The article accompanying this illustration includes the following statements regarding the propagation of this variety, which are credited to Mr. Samuel B. Parsons.

"Its habit of growth is so decidedly weeping and the leaves and branches so thick that it was at once suggested to graft it upon high stocks, like a Kilmarnock Willow, for example. But the great expectations of securing an evergreen tree form of unique and incomparable grace thus reasonably entertained have not been fulfilled. It may be readily grafted on high stocks, but it does not thrive as well, the naked steam cracks and suffers, and the massive foliage, like that of most evergreens perched upon high stems, is too heavy for grace and proportion, and is beaten and tossed by the winds."

Here there is definite record that some of the propagations had been made "upon high stocks." Although this method was found less satisfactory than low-grafting it was without doubt responsible for certain of the plants with the standard-form which are now to be found in culture. It appears, also, that in nursery treatment certain plants that had been grown from low grafts or from layers were staked and the laterals pruned and thus forced to form a main erect stem to a distance of several feet. This method is now employed by certain nurserymen (The Hemlock Arboretum Bulletin No. 25, Jan. 1, 1939) in forcing propagations to become taller.

Further information regarding the early propagations of these hemlocks has been supplied by Mr. Jacob C. van Heiningen, now proprietor of the South Wilton Nurseries at Wilton, Connecticut. The following is quoted from a letter which he wrote to the writer:

"While I worked for The Parsons & Sons Nursery Co., I heard that Mr. J R. Trumpy, the famous propagator who was brought over on a sailing vessel by Mr. Samuel Bowne Parsons from Hugh Low & Co., London, England, before the Civil War, was sent to Fishkill-on-the-Hudson to get scions of the original plants and as far as I understand the first plants shown were at the great exhibition in Philadelphia, Pa., in 1876 and the Parsons were the first to introduce these Hemlocks in the trade."

Specimens of Sargent Hemlock

Plants obtained by the early propagations of the Fishkill seedlings are now to be seen at various points about New York, Philadelphia, and Boston. Many of these are taller than either of the two survivors of the four originals. Several of these plants may here be mentioned and illustrated.

In Fairmount Park, Philadelphia, are four members of *Tsuga canadensis* var *pendula* which were planted near the Horticultural Hall at the time of the Centennial Exposition in 1876. These are all, presumably, early propagations by graftage from scions of some one or more of the four original seedlings noted above. They are now from 12 to 14 feet tall. One (Figure 2) is much branched close to the ground; two are low branched but at a somewhat higher level; and one has a single main trunk to a height of about 3 feet. Many of the lower branches on these plants have died and been removed by pruning. The stubs of branches rather

recently sawed off and the scars of branches removed at earlier dates are rather conspicuous and numerous. These four individuals are not as large or as vigorous as are many other propagations about Philadelphia that are at least no older.

On the grounds of Bryn Mawr College there is a group of nine individuals whose tops merge. One is a large plant about 18 feet in diameter and about 12 feet tall with a trunk which forks about one foot above the ground. The two individuals next in size have the standard form with their first branches starting from a main stem at a height of several feet. There are six smaller plants that are low-branched. Evidently these nine plants are of various ages from propagation.

On the estate of Miss Mary K. Gibson, Wynnewood, Pa., there are eight pendulous hemlocks which, it is said, date to the time of the Centennial Exposition. Seven of these have a standard form with erect main stems without (at present) side branches for at least four feet. Several are fine specimens with pendulous branches that reach to the ground. One other plant has a trunk that is low-branching. A small plant that is regarded as a seedling which was formerly growing in a shaded location in underbrush at Wynnewood was transplanted to the Hemlock Arboretum of Mr. Charles F. Jenkins at Far Country, Germantown, Pa., in the spring of 1938. This young plant has an erect main trunk about four feet tall which is then divided into drooping branches.

At the Morris Arboretum near Philadelphia there are two splendid specimens of the Sargent hemlock, both of which have the standard form of trunk.

One ("M-672") is 15½ feet tall and 24 feet in greatest diameter (spread). Near the base of the main trunk there is one lateral about seven inches in diameter; otherwise the main stem is now unbranched and it is nearly erect to a height of about ten feet where there are two abruptly divergent main branches and some smaller ones which break into a crown characteristic of the pendulous habit. The diameter of the main trunk at breast height is 13 inches.

The other of these two trees is 11 feet tall and 16 feet in spread. Its main trunk has a diameter of 7½ inches at breast height; it is erect to a height of about seven feet but has several laterals, the largest of which is about three inches in diameter, and in the crown it breaks abruptly into several divergent branches which are again branched in the manner characteristic of the pendulous habit.

At Inver House, an estate in the hills of Delaware County, Pa., there are eleven splendid specimens of the Sargent hemlock. All are of the low-branching shrub form with a height of about 12 feet and a spread from 20 to 25 feet, and the green foliage extends to the ground. Seven of these stand in a row along and partly under a row of tall maples at the border of a spacious area of lawn. It is stated (The Hemlock Arboretum Bulletin No. 21, Jan. 1, 1938) that "at one time a dealer had sold six of these remarkable trees to a gentleman in Long Island for $1200.00 each, delivered and planted," but that difficulties arose in regard to the transportation and sale and the order was finally cancelled.

In the immediate vicinity of New York, especially in Westchester County, on Long Island, and in New Jersey there are splendid specimens of the Sargent hemlock, some of considerable size, which probably came from the early propagations of the Parsons Nursery.

The history of one of these, now growing on the estate of Mr. W. R. Coe, is reported by Mr. P. D Vossberg of Hicks Nurseries, Inc., as follows:

"This plant was growing in a neglected lot between Flushing and College Point. When spotted by the buyer, children were playing in the branches and a cow was tethered to the trunk. This specimen most likely was one of the first grafts made by the Parsons Nurseries. It suffered some from moving and still shows marks of this operation."

On the grounds of the Tioronda Corporation and not far from the original seedling which was planted there (the *Tioronda* hemlock) on the property formerly owned by General Howland, there is a specimen of Sargent hemlock now nine feet tall and 23 feet in spread. It stands in the shade of overtopping trees, is much branched from the base, has lost numerous lower branches, and appears much like the weeping hemlocks at Fair mount Park.

At Fishkill, N. Y., on a property owned by Mr. Irvan Berrian there is a large weeping hemlock said to be a grafted propagation obtained at an early date by a Mr. Gaines who lived in Beacon. This tree is 13 feet tall and about 25 feet in spread. A single short main trunk is four feet six inches in circumference and it

WEEPING HEMLOCKS AND THEIR BRANCHING HABITS

(Photographs by A. B. Stout. All the plants are reproduced at approximately the same scale.)

The Holm Lea hemlock.

Specimens in Fairmount Park, Philadelphia.

A tree of standard form at the Morris Arboretum, with Mr. J. R. Adams of the scientific staff. This tree was one of the early propagations from the original Fishkill seedlings.

4 and 5. Branches and trunk of Horton hemlock.

6. *The Horton, largest specimen known of the weeping hemlock of the Sargent type.*

soon forks into two large branches each more than three feet around. Both of these and the main stem are flattened and decidedly ribbon-shaped. Many branches have died and been removed, especially on the north side facing the street; but on the other side the green branches reach to the ground. (See Figure 8.)

Seedlings of Sargent Hemlock

Seedlings in considerable number have been grown from seeds obtained from plants which are propagations; but it is not known how many of the four wild plants were propagated and which one or more of them are involved in the parentage of these seedlings. The record for some 2,000 of these seedlings has been given by Charles F. Jenkins (The Hemlock Arboretum Bulletin No. 11, 1935). Additional information regarding these seedlings has been supplied to the writer in a letter from Mr Jacob van Heiningen and from this letter the following is quoted:

"I beg to inform you that the 2,000 hemlocks we raised from seeds were from seeds collected in 1906 from two Sargent weeping hemlocks which were growing near the office of the Parsons & Sons Nursery Co., Flushing, L. I., at that time but since cut down by real estate operators I shipped the seeds to my brother in Holland and they grew 100% weeping. After they grew to a size of one to two feet they were sold in large quantities in Europe and the U. S. A In the spring of 1918, the last year we could import to the U S A., I received 150 plants of which I still have two original plants left, of which I enclose herewith one picture of each on the back of which you will find the exact dimensions of the plants, which will give you an idea of the difference of size and habit of the two plants of exactly the same age. In the meantime we grew a lot of young plants (layers) of the original imported plants, which we will be glad to show you any time. We have a nice lot of them The other original plants I sold to customers of mine, like Col. Montgomery, Mrs. Walter C. Teagle, Mrs. Stillman Rockefeller, etc. I grafted a number of hemlocks of different varieties but do not recommend that way of growing them; they unite O. K in the incubator, but the trouble starts after they are planted in the nursery for they keep on dying the next 3-4-5-6 years. . . . Therefore I do not propagate them that way any more but use the old-fashioned way of layering which is naturally perfect, as they are on their own roots."

Of the two seedlings still retained in the nursery at South Wilton one is 2 feet tall and 7 feet in spread with a top that is flattened; the other is 4½ feet tall and 12 feet wide and the top is more rounded. (See the illustration on page 156.)

In the South Wilton Nurseries are also several hundred propagations by layering from various of the seedlings that were grown by Mr. van Heiningen. These are now about 15 years old; every one has the low-branched framework and the pendulous habit characteristic of the Sargent hemlock. They vary somewhat in height, but are otherwise very uniform in character.

Seedlings obtained at The New York Botanical Garden. The several specimens of Sargent hemlock at The New York Botanical Garden are, it is believed, of nursery propagation. All have the shrub habit and are rather dome-shaped, but some are branched lower than others. Several have green branches that reach to the ground; on others the lower branches have died. The largest of these trees are now about 7 feet tall. In 1916 the writer collected seeds from one of these plants which was then about 4½ feet tall. About 25 seedlings were obtained. All but one were pendulous and six years later these varied in height from 10 inches to 2 feet. Some were rather flattened in form while others were more erect and rounded in profile Five of these plants are still under the observation of the writer. The only one which is not pendulous has a large main stem and one smaller one arising from the ground and both are erect and excurrent with a habit of growth that is normal. The largest of the others is now almost 4 feet tall (see Figure 10) and the smallest is 3 feet tall. During the 23 years of their growth under very favorable conditions the rate of increase in height for the largest seedling has been slightly less than two inches each year.

The Kelsey Weeping Hemlock Tree

A form of weeping hemlock somewhat different from that of the Sargent hemlock is shown in Figure 7. The writer saw this tree at the Kelsey-Highlands Nursery in April 1936 and was given the information regarding its history by Mr. Harlan P. Kelsey. This plant was observed about 1911 in the edge of a woods on the property of the Kelsey-Highlands Nursery. Mr. Kelsey considers that sev-

7. *The Kelsey hemlock, a different form from the Sargent type; Mr. Harlan P. Kelsey beside it.*

8. *Low branching in a weeping hemlock tree of the Sargent type. This tree was propagated from one of the four original seedlings.*

9. *Branching habit of the shrub-form Tioronda hemlock.*

10. *One of the seedlings raised by the author, who is standing behind it.*

s of another seedling raised
The dominance of laterals

A propagation of the Sargent hemlock at "Far Country," with Charles H Jenkins who has a large collection there of the forms of the Canadian hemlock.

eral young seedlings grew under or near an old tree of considerable size which is now believed to have been of somewhat weeping habit. This tree died some years ago after being struck by lightning. The seedlings were transplanted to a plot in the nursery, where one soon died. Mr. Kelsey was of the opinion that one of the original seedlings had been given to the Arnold Arboretum but no trace of such a plant was found in the records by Mr. W. H. Judd when I visited him a few days later. At any rate, the fine specimen shown in Figure 7 is the only one of the original seedlings definitely known today.

This plant has two main and divergent trunks which ascend from the extreme base. One is larger than the other. The lateral branches of both are decidedly pendulous but they do not dominate their immediate terminals, the main axis of growth does not shift to them, and they do not fill in with divergent branches to give a dome shaped and compact crown characteristic of the members of Sargent hemlock.

Several "grafted" plants from scions of lateral branches of this plant are now growing in the Kelsey-Highlands Nursery; all have a single main axis which is contorted. Of the propagations at the Arnold Arboretum, one has several main branches arising from close to the ground, but all others have only one single main axis which is almost vine like. In some cases the stem was tied to a stake and thus forced into a somewhat erect position Mr. Charles F. Jenkins (The Hemlock Arboretum Bulletin No. 10, 1935), in speaking of a propagation of the ***Kelsey*** hemlock which he has, says, "It looks as though it could never throw up a leader with enough backbone to stand up straight."

There is as yet no evidence that this particular plant, or the clone propagated from it, will breed true from seeds or that the particular character seen in this mutation will ever occur in sufficient number of seed progenies to constitute a botanical variety. Hence a purely horticultural name such as "***Kelsey***" hemlock will be most suitable for the members of the clone obtained from this individual.

Mr. F. L. Abbott, who has collected and grown variations of wild hemlocks in Vermont, states in a letter to the writer that a large tree of weeping habit which grows near his farm is more like the ***Kelsey*** hemlock than like any of the members of the Sargent hemlock. Possibly propagations of this tree will in time find a place in horticulture, in which case the clone might be known as the ***Abbott*** hemlock.

The So-Called "Tsuga canadensis var. *milfordensis"*

In addition to the type of *Tsuga canadensis* var. *pendula* (Sargent hemlock) and that seen in the ***Kelsey*** hemlock, one other weeping type has been recognized in literature under the name *"T. canadensis* var. *milfordensis."* This was described as dwarf, globular in form, and with slender drooping shoots and leaves that are shorter than normal for the species. But evidently only one individual of this type was known. It is stated* that this plant was growing in Fairmount Park, Philadelphia, at the time of the Centennial Exposition but its origin and fate seem not to be known.

Other Types of Weeping Hemlock

There are now growing in the South Wilton Nurseries numerous seedlings of the Canadian hemlock which exhibit a most remarkable series of variations. Several of these are to be classed as more pendulous than the normal type of this species. In some of these the main framework is erect and excurrent but more branching and compact than is usual. In others the framework consists of several erect stems whose numerous branches combine in a rather dense body of foliage of several shapes. In some of the seedlings the ends of the branches are slender and elongated; in others the twigs are thickened and the leaves compacted and short. In several of these plants the main framework and the habit of branching are essentially the same as in the Sargent hemlock but the tips of the branches are compact in growth and are stiffly drooping rather than fully pendulous. There are, among these seedlings, different combinations of variations in the characters of the main axis, in the disposition of the terminal branches, and in the character of the twigs as to diameter-growth and the size and the disposition of the leaves.

It is understood that in a comprehensive survey of the variations in the Canadian hemlock, being prepared by John C. Swartley, a consideration of the weeping forms will be included.

Concluding Remarks

The pendulous habit of growth in the main framework and lateral branches of plants of the Sargent hemlock (*Tsuga canadensis* var. *pendula*) is a variation or mutation of conspicuous character. Only five individuals of this particular type have been found wild and the numerous plants of the type now in culture are either propagations or seedlings derived from certain of these.

This mutation is essentially a change in the direction of the growth of the branches. The main axis of a seedling, a scion, or a cutting is unable to assume and maintain the fully erect position characteristic of the negatively geotropic reactions in the growth of a normal excurrent trunk. It leans away from the erect posture and is from the start more like a lateral branch. This habit of growth extends to the successive branches, none of which are able to assume a dominant erect position as one or more laterals usually do when a leader with a strongly excurrent growth is removed. But some of these sub-terminal branches rise higher than their own terminals either in positions above them or at divergent angles, and also the axis of greater growth in diameter is shifted to them to form a sharp angle in this axis or is distributed to form a fork. The divergent positions of the numerous ascending and drooping branches combine to form a dome of green foliage that often extends to the ground in a nearly circular outline. The character of the end branches in respect to growth in diameter and to the size and disposition of leaves seems to be quite like that which is normal for the species. Evidently the framework is usually low-branched but a standard form may develop either naturally or under nursery treatment when the main growth is somewhat

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* John C. Swartley. The Eastern Hemlock and its Varieties. *Arborist's News* 3: No. 4. April 1938.

continued in a single unit before it breaks into major divisions. In other pendulous mutations, now known in the species *Tsuga canadensis*, somewhat different features of growth are to be recognized, either in the main axis or in the character of ends of branches and in the leaves.

It is of special interest that the pendulous character of the Sargent hemlock breeds true. Of approximately 2,000 seedlings thus far grown from open-pollinated seeds obtained from plants grown as propagations, all but one have the pendulous habit of growth, and also vegetative propagations are remarkably true to type. From this it appears that at least some one or more of the Fishkill seedlings which were propagated are, in the genetic sense, "homozygous" for the pendulous character.

A well-grown plant of the Sargent hemlock is indeed a specimen plant that is to be rated among the most beautiful and graceful of the many excellent evergreens in cultivation.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

G. M. Smith's Two Volumes on Cryptogamic Botany Hailed As Noteworthy Texts

CRYPTOGAMIC BOTANY. Volume I. Algae and Fungi. Gilbert M. Smith. 545 pages, 299 figures, index McGraw-Hill, New York and London. 1938. $4.

The publication in 1938 of a single volume devoted exclusively to a general discussion of algae and fungi was a genuine contribution. Until the appearance of Smith's Cryptogamic Botany, Volume I, there has been a great gap between outmoded introductory treatments and those of a status too technical to be practical for a beginner in this field.

In the introduction the author clearly states his own position: he has endeavored to present an account of representative forms and the most probable natural relationships of the larger groups. He recognizes unhesitatingly the impossibility of arranging a phylogenetic classification which will not raise argument. By presenting examples of each group lucidly and accompanying them with a generous bibliography, Smith has given the reader adequate facilities for weighing the evidence to reach his own or the same conclusions

Smith's classification is exemplary for its clarity and convenience. Among the algae the combining of the Chrysophyceae, Heterokontae, and Bacillariophyceae into a single division, the Chrysophyta, and similarly the Cryptophyceae and Dinophyceae into the division Pyrrophyta, results in a logical arrangement of closely related forms. Likewise in the fungi the separation of the subclasses Protoascomycetaceae and Euascomycetaceae is drawn upon critical lines more in accord with current taxonomic criteria than previous segregations in the Ascomycetes.

In hypothecating the origin of the fungi, the basic distinction between a polyphyletic origin (a widely expressed view having its most recent backing in Clements and Shear, The Genera of the Fungi) and a monophyletic origin from either an algal ancestry or colorless flagellates, is not clearly defined. Some legitimate dissension might be raised over the exclusion of the Myxothallophyta from the fungi proper. Particularly it might be noted that certain Phytomyxinae—*Spongospora* and *Plasmodiophora*, here allocated to the Myxothallophyta –have been shown to possess two anterior flagellae of unequal length. In the Ascomycetes the position of the Exoascales might be questioned on the basis of the author's own definition of the subclasses erected. If one follows his substantiation of this point there would be opened to criticism the position of numerous anomalous groups.

In the discussion of the origin of the Basidiomycetes and the possible relationships of its members, the author has overlooked a frequently proposed hypothesis

that the most primitive forms are to be found among the simpler Tremellaceous heterobasidiomycetes from which the rusts are then derived through reduction. If, however, one seeks the origin of the Basidiomycetes in the homobasidial type, it is to be found, perhaps, in the simpler Corticiaceous basidium which commonly produces eight or six sterigmata and spores,—a type of basidial form not included in this discussion.

The foregoing remarks should not be allowed to detract from the fundamental importance of this book. It is beyond doubt a noteworthy addition to the text-book world.

GLADYS E. BAKER,
Hunter College.

Volume II

CRYPTOGAMIC BOTANY. Volume II. Bryophytes and Pteridophytes. Gilbert M. Smith. 380 pages, 244 figures, index. McGraw-Hill, New York and London. 1938. $3.

The rapid growth of botanical science within the last two generations and the resulting enormous literature make it impossible for even the most avid reader to keep abreast of all that is published. While this may have its drawbacks, it is compensated for, in a measure at least, by excellent texts and reviews of special fields, the like of which were largely unknown to our botanical grandfathers. The volume under consideration will take its place as one of these.

Professor Smith has brought together and digested a vast literature, and he presents it in a simple and direct way that almost belies its complexity. In keeping with this is the author's clear, straightforward style, completely free of the aura of labored encumbrance too often characteristic of the scholar. The illustrations are well drawn and practically all original.

The Bryophyta, which, according to Smith, had as their probable progenitors, the "ulotrichaceous series of the Chlorophyceae," are divided into three groups: the Hepaticae, the Anthocerotae, and the Musci. The suggestion of Howe that the Anthocerotae be given equal rank with the Hepaticae is coming to be more and more generally accepted. Considerable emphasis is placed upon the members of this group as possible ancestors of the Pteridophyta The author seems to favor the antithetic theory of alternation of dissimilar generations in the Bryophytes and explains their dissimilarity, in part at least, by the "parasitism of the intercalated generation upon the sexual generation." It is not surprising therefore to find the Hepaticae considered before the Anthocerotae.

The Pteridophyta are divided into four classes: the Psilophytinae, the Lycopodinae, the Equisetinae, and the Filicinae, given in this sequence. The importance of the first of these four is duly emphasized, and the last three are considered to have evolved in three different directions from the Psilophytinae. Each of these classes is discussed in considerable detail.

Other authors may disagree with some of the tenets presented or defended; more advanced students may wish that Professor Smith had divulged to them more of his mature philosophical reflections and conclusions. But this would have enlarged the book, and decreased its value as a usable text.

EDWIN B. MATZKE,
Columbia University.

Botany for the Beginner

AN INTRODUCTION TO BOTANY. Arthur W. Haupt. 396 pages, indexed and illustrated McGraw-Hill, New York. 1938. $3.

As indicated by its title, this book is designed merely to serve as an introduction to the science of botany. It is planned for use in the first year of college and can be covered in a single semester. For this reason it is not at all comprehensive—and this probably is its chief value. A great many far more comprehensive text-books on botany are available, each designed to cover a full year or more of college work. The present book, however, will fill a long-felt need in such institutions where a one-semester course in botany is desired in the curriculum. It does not make any attempt to cover the subject in an exhaustive manner, but strives merely to furnish a sound foundation of fundamentals upon which more advanced studies may be based.

After an introductory chapter outlining the features common to plants and animals, the distinctive characteristics of plants, and the scope of botany, the author takes up, in succeeding chapters, the vegetative organs, the protoplasm and the cell, the vegetative tissues, functions

of living plants, such as absorption, conduction, transpiration, metabolism, and irritability, and environmental relations or ecology. This is followed by chapters on the flowers and fruit, floral evolution and pollination, seeds and seedlings, and, finally, heredity and plant breeding.

What may be regarded as the second part of the book is taken up with chapters on the great groups of plants in taxonomic sequence, in which the morphologic and physiologic characteristics of each group are briefly discussed and illustrations provided. There are chapters on the algae, fungi, bryophytes, pteridophytes, gymnosperms, and the chief families of angiosperms. Discussions of the plant life of past ages (paleobotany) and of the principle and causes of evolution are also appended. The 278 text-figures are clear and well chosen to illustrate the salient points of the text.

H. N. MOLDENKE.

A Forestry Book For Laymen

THE NATION'S FORESTS. William Atherton Du Puy, with an introduction by F. A. Silcox. 264 pages, illustrated, indexed. Macmillan, New York, 1939. $3.

Most books on forestry, naturally, are written by technical men who sometimes find it difficult to tell their story simply. William Atherton Du Puy, on the other hand, approaches his subject of The Nation's Forests from the standpoint of the layman rather than the forester, hence his book is more easily read, though it is none the less factual.

Telling the story of the forests of the United States from the days of our first settlements to the present time, the author traces the sawdust trail of the lumberman from the Northeast through the Middle Atlantic States, the Lake States, the South and finally to the Pacific Coast, which is the center of today's lumber industry, describing as he does so the various species of importance in each region, their manner of growth, their insect and fungous enemies and the like.

The opening chapter, Everyman's Forest, pictures vividly the extent and location of the 175 million acres of National Forests which now reach into 38 states, Alaska, and Puerto Rico, and makes the reader really feel that he owns an acre and a half of forest land containing certain kinds of trees. The book deals at length with the activities of the Forest Service in building up cut-over areas through planting and silvicultural treatment, in furthering the ideal of sustained yield from forest land, erosion control, range management, development of recreational facilities and the co operation with private industry, which owns 70 per cent of the nation's forest land.

In one chapter Du Puy explains the succession of species in the development of a mature forest, touches upon the mystery of the treeless prairie country and holds up the bare mountains of China as horrible examples of regions where forest exploitation is claimed to be the cause of erosion, sand storms, floods and general impoverishment. In the following pages the author attempts to show that care in selecting the trees to be cut will keep the forest continually productive and will even improve its condition.

Other sections deal with the tragic toll taken each year by the red demon Fire, and with the Wilderness Areas which have been set aside for the enjoyment of those who love the solitude of a world undisturbed by man.

Like many conservationists, the author paints rather a harsh picture of the lumbermen of early years who "cut out and got out," without describing also the economic conditions which encouraged this policy. He dwells at some length upon the "ghost towns" left by the lumbermen who followed the stands of virgin timber, without, perhaps, giving a true understanding of the marvelous growth of our country in terms of railroads, schools, and homes which were made possible only through the ready availability of vast quantities of low-cost construction lumber —to say nothing of the pulpwood which has enabled us to supply even our people of low income with schoolbooks, newspapers, magazines, and moving picture film which are the envy of most other countries.

The book is profusely illustrated with excellent full-page photographs, most of them by the U. S. Forest Service. It is well worth reading and should be especially interesting to young people who wish to acquire a "speaking acquaintance" with our most important renewable resource.

REGINALD T. TITUS, M.F.

Woody Plants of California

CONSPICUOUS CALIFORNIA PLANTS with notes on their garden uses. Ralph D. Cornell. 192 pages, 36 plates. San Pasqual Press, Pasadena. $4.

The author of this very attractive volume has gone up and down the length of California, has lived in the mountains and the deserts. He has taken many pictures of trees and shrubs, forty-six of these being beautifully reproduced in this volume.

The plants described are all woody and native to California. Appropriately, he begins with the sequoias, and continues with eight other trees; then follow sections on the chaparral and the desert, and he concludes with a short section on conservation. There is a short appendix—Garden Notes—on how best to use the plants described, and related forms, for garden and landscaping.

Descriptions are written in a non-technical manner, often almost poetic in phrasing, for the author loves the plants of the mountain slopes and deserts. He has gathered much information about the uses made of trees and shrubs in early days by the Indians. After reading of the many seeds and fruits ground up to make "pinole", one is impressed not so much by the number of edible plants as by the necessity that forced the Indians to make use of them

The author, being a landscape artist as well as a plant lover and photographer, makes frequent references to the use of the trees and shrubs for planting about homes, with warnings as to the undesirability of putting plants into unnatural settings, or making life too easy for ones used to the hardships of desert life.

Unfortunately, a few errors will be found, such as the statement that the petrified forest of Arizona was a sequoia forest that became submerged under the sea (most of these fossil trees are conifers but not sequoias, and they were undoubtedly submerged in a large lake); also the reference to sycamore as dioecious and to yucca fruits as being six-celled.

The book will be read with pleasure by anyone acquainted with California plants and with profit by those in the southwest who appreciate having native plants about their homes.

GEORGE T. HASTINGS.

Mrs. Comstock Lives Again In a Revised Handbook

HANDBOOK OF NATURE STUDY. Anna Botsford Comstock. 24th edition. 937 pages, illustrated; index; bibliography. Comstock Publishing Co., Ithaca, 1939. $4.

The 24th edition of Anna Botsford Comstock's Handbook of Nature-Study is a handsome new book. Students and teachers of nature study who have used the earlier editions will be glad that the corrections and additions in this volume have in no way spoiled the flavor and charm that made the Handbook their favorite nature study guide.

Mrs. Comstock's genius as a teacher, coupled with her wide and thorough knowledge of plants and animals and their environments, gave her book first place among nature books in 1911 and for many years thereafter. Now, in 1939, revised and reprinted, it will again take a very important place in all nature libraries. Schools and camps, museums and libraries throughout the country will want the new Handbook.

Many experts in various fields of natural history contributed to the revision of the book. Approximately 300 separate nature subjects are treated, covering plants and animals, the earth and the sky. An excellent annotated bibliography is included, a very valuable addition.

ADA KNEALE BURNS,
Director of Staff,
School Nature League.

Brief Notes on Varied Books

Garden Design of the Year

GARDENS AND GARDENING—1939. Edited by F. A. Mercer. 128 pages of illustrations with a brief accompanying text Index to illustrations. Studio Publications, New York, 1939. $4 50.

The Studio annual, Gardens and Gardening, is a welcome volume when it appears for it is a book that the garden lover can browse over profitably for innumerable hours during the year. It is packed with designs and ideas for gardens of many types—peaceful water gardens, smooth lawns with adjacent plantings, paths with floral and shrubbery borders, rock gardens, plants around houses, formal arrangements, ornaments, gates, and garden furniture, and portraits of new

and interesting floral subjects for outdoor use.

While the body of the book is composed of photographs, it is introduced by a series of articles called "Progress in Garden Design" written by leading landscape architects from six different countries.

Out of the Sixteenth Century

THE FIRST GARDEN BOOK, by Thomas Hyll, 1563. Edited by Violet and Hal W. Trovillion. Trovillion Private Press, Herrin, Illinois, 1938. $2.50.

In what is reputed to be the first garden book ever printed in English, we read that "The Garden which lieth vnder a getle and holsome ayre, and hath a fountayne or spryng runnying through it, is in a manner good ynough of itself and neadeth small instructions for the sowying thereof."

But we might never have learned this —or many another bit of garden wisdom —had not the Trovillions at their private press undertaken to reprint in the original spelling (but fortunately not in the original difficult type face) the "First Garden Book" of Thomas Hyll, the only extant copy of which, published in 1563, now lies in the British Museum. Some of the original pages and a portrait of Thomas Hyll (sometimes spelled Hill) are reproduced.

Animal Life in the Garden

GARDEN CREATURES. Eleanor King and Wellmer Pessels. 64 pages, illustrated. Harper, New York, 1939. $1.25.

Eleanor King and Wellmer Pessels, whose Insect Allies was reviewed here in April, have produced another engaging book which describes the beetles and worms, the snails, toads, caterpillars, other small forms of animal life, and even some of the snakes and birds which one is likely to find in the garden. The illustrations reveal the intimate lives of these familiar creatures, about which most of us really know so little and wish to know more.

CAROL H. WOODWARD.

For Designers

DECORATIVE PLANT FORMS. Herbert W. Faulkner. 30 plates, paper covered. Harper, New York, 1939. $1.50.

In the library at the Garden any person who notices how many artists are there nearly every day in search of plant forms to use in design will appreciate the value of a sketch-book such as the one which Herbert W. Faulkner has prepared for the use of designers, craftsmen, teachers, and others. The book consists of thirty plates, each showing pen-and-ink drawings of flowers and leaves which might be useful in decoration.

Current Literature At a Glance*

By Virgene Kavanagh

Color Chart. Volume I of the Color Chart being published by the Royal Horticultural Society in London contains one hundred colors with four tones to each of them. Besides the name bestowed by the British Colour Council, names of colors are given in French, German, Italian, and Spanish. In addition, there are references to the "Repertoire des Couleurs," to Ridgway, and to Ostwald's "Color Standards." So far as possible, for each tone a horticultural example is given, including varieties of such widely hybridized plants as lilies and roses.

Lichens and Leaves. Two articles of special interest to amateur botanists have appeared in the *School Nature League Bulletin*. "The Lichen Clan" by John W. Thompson furnishes a simple illustrated guide to the identification and uses of common lichens (January). In "Maples of New York City and Vicinity" Dr. A. H. Graves gives pictures of the leaves, fruits, and fruit clusters of eleven species of maples with excellent descriptions of the trees (May).

Fritillaria. In the March issue of the quarterly bulletin of the Alpine Garden Society appears an interesting study of European species of the genus *Fritillaria*. Both this article and "Some Plants from the Eastern Mediterranean," furnish several useful ideas to persons making rock gardens.

City Gardens. Plans for a 10 by 10-foot garden on a roof and another in a city back yard are included with the reprint of the broadcast given June 3 by the Radio Garden Club. Alice Dahn was the speaker. Copies of the broadcasts are issued by the Extension Service of the State of New Jersey at New Brunswick.

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* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Notes, News, and Comment

Tea. The President, the Board of Managers, and the Advisory Council of the Botanical Garden entertained members of the Garden and their guests at a spring tea the afternoon of May 15. The perennial border and the rock garden were on view. Tea was served in one of the model gardens.

Herbarium. A collection of 8,257 herbarium sheets, consisting of plants from England, western continental Europe, northeastern United States and adjacent sections of Canada, has been presented to The New York Botanical Garden by Mrs. T. W. Edmondson. They are the collections made by her husband during vacations over many years. Dr. Edmondson was professor of mathematics and physics and, before his death last fall, professor emeritus, at New York University. His collections contain a valuable set of about 300 ferns from central Europe, also about 200 published sheets of species of *Hieracium* from England, besides an additional 100 representatives of this genus from Germany.

The Garden has also acquired about 100 volumes of botanical books from Dr. Edmondson's library. These include a complete set of Hegi's Flora von Mittel-Europa, besides other reference works which will be placed in the herbarium.

Medal. For a group of seven specimen begonias exhibited June 6 in "Gardens on Parade" at the World's Fair, The New York Botanical Garden received a silver medal and a cultural certificate. The collection included *Begonia echinosepala, B. prunifolia, B. maculata Wightii,* and ***Dorothy Grant.***

Explorer. Boris A. Krukoff, who has been working on *Erythrina* and other genera of poisonous and medicinal plants at The New York Botanical Garden during the past two years, left last month for a six months' expedition in Bolivia.

Scholarships. Among the recipients of scholarships this summer at The New York Botanical Garden are Miss Selma Kojan, who has been doing volunteer work at the Garden, and Miss Elizabeth Waterbury, of New Jersey College for Women, both of whom began their work on problems in Hemerocallis behavior in June

Dr. Margaret Fulford from the University of Cincinnati is continuing her studies of the Hepaticae on a two months' scholarship, and Dr. Stanley A. Cain of the University of Tennessee is expected for one month to pursue some special work in plant ecology.

Botanical Conference. Dr. and Mrs. A. C. Smith and Dr. W. H. Camp were among the 75 or more persons who attended the botanical conference and foray at Blacksburg and Mountain Lake, Va., June 16-18. The gathering was sponsored by the Botanical Society of America, American Society of Plant Taxonomists, Sullivant Moss Society, American Fern Society, Southern Appalachian Botanical Club, and the committee on flora of the Virginia Academy of Science. Hosts for the meeting were the Mountain Lake Biological Station of the University of Virginia, with Dr. I. F. Lewis as chairman, and the department of biology of Virginia Polytechnic Institute, with Prof. A. B. Massey as chairman. The meeting included field trips in the mountains on Friday and Saturday, with a Sunday trip to the Peaks of Otter, 80 miles away. At the Friday evening assembly, Dr. Camp spoke on "Continental Displacement and the Origin of the Southern Appalachian Floras," and on Saturday evening he addressed the group again and led in the discussion of the broader aspects of evolution and biotic dispersal as related to continental displacement. Others on the program on Thursday and Friday evenings were E. Lucy Braun, A. J. Sharp, H. L. Blomquist, H. R. Totten, M. L. Fernald, and Earl L. Core.

Research. Miss Edna Kobs of Randolph-Macon College, Lynchburg, Va., and Dr. Ernst Naylor of the University of Missouri, have returned to the Garden this summer to continue their studies, respectively, on sugar and vegetative propagation.

Advisory Council. Mrs. Roswell Miller, Sr., was elected a member of the Advisory Council of The New York Botanical Garden at a meeting of the Board of Managers May 18.

Visitors. Botanists and other visitors who have registered in the library during the past few weeks include George H. Shull of Princeton University; T. C. Jack of Kenya Colony, East Africa; K. Wada of Numazu-shi, Japan; F. Gertrude

Williamson, Occidental College, South Pasadena, Calif.; Robert T. Clausen, Cornell University; E. D. Merrill, Arnold Arboretum; F. R. Fosberg, University of Pennsylvania; James Walters, University of California; B. M. Duggar, University of Wisconsin; Iris F. and J. Harold Long of Christian College, Columbia, Mo.; Paul D. Voth, University of Chicago; Mrs Ralph Bogart, Columbia Mo.; Mr and Mrs. R. A. Silow, Cotton Station, Trindad; Frank G. Mackaness, Dillard University; and C. A. Wetherby of the Gray Herbarium, Cambridge, Mass., who was erroneously reported last month to have come from Cambridge, England.

Student Gardeners. Two of The New York Botanical Garden's student gardeners began new appointments at the Montreal Botanical Garden July 1. Adelard Bisaillon, who received his certificate from the Science Course in April, goes there as greenhouse foreman, and Philip Chandler, formerly of the Royal Botanic Gardens at Kew, has been made outdoor foreman at Montreal.

John Bachmann, who also was graduated from the Science Course last April, has been appointed a gardener at Connecticut College, New London.

Samuel Bridge sailed on June 28 for a year as exchange student gardener at Kew, and J. W. E. Stott, who has been appointed by Kew for a year at The New York Botanical Garden on exchange, arrives July 3.

Travelers. Professor T. H. Goodspeed of the University of California, with Mrs. Goodspeed, stopping in New York on their return from a year in South America, spent several days at the Botanical Garden late in May and were entertained one evening by the Columbia Faculty Club at dinner, where Dr. Goodspeed spoke on some of the highlights of his sojourn south of the equator.

Argentina. Accompanying Dr. and Mrs. T. H. Goodspeed on their return to America and their visit to The New York Botanical Garden in May was Mrs. Julia B. de Saint of Buenos Aires, founder and president of the Argentina Horticultural Society. She had been visiting gardens and institutions throughout this country, studying, among other things, scientific achievements in the improvement of plants over their natural endowments. She is working to win official recognition in the Argentine of the importance of scientific investigation in advancing horticulture in her country, and hopes to establish there a well equipped school of horticulture which will serve as a nucleus for her aims, through which she foresees a new link in international understanding.

Garden Clubs. During May, members of the garden clubs of Laurelton, Mount Vernon, Pleasantville, Nyack, and Glenrock, besides the garden departments of the woman's clubs of Ridgewood and Glen Ridge, N. J., visited special plantings at the Botanical Garden under the guidance of a member of the staff.

Students. George T. Hastings brought 360 biology students from Roosevelt High School to visit the main conservatories May 23 and to hear a lecture in the museum building afterward. The biology class from Emerson High School, Union City, New Jersey, visited the rock garden and the main conservatories with their instructor June 8, and the following week a group from Hawthorne School, Teaneck, N. J., made a similar tour of the grounds under the leadership of a staff member.

Photographers. The Biological Photographic Association will have its ninth annual convention Sept. 14-16 at the Mellon Institute for Industrial Research in Pittsburgh. Information may be obtained from the secretary at the University Office, Magee Hospital, Pittsburgh, Pa.

From Montreal. Stephen Vincent, director of the horticultural training course which is being planned at the Montreal Botanical Garden, is spending two months at the New York Botanical Garden this summer to study the methods used in the training of student gardeners.

Suhuaro. The Garden's specimen of *Carnegiea gigantea*, the suhuaro of the southwestern desert, came into bloom late in May and flowered for about two weeks. The plant, which stands as a single, unbranched column about 8 feet tall, was obtained last October from Tucson, Arizona, through co-operation of the University. While other specimens have been kept under glass in a number of hothouses, it is seldom that they have been known to bloom. The flowers are greenish white and rather inconspicuous, opening from knob-like buds near the summit of the column. The fruit has long been used by the Indians for food. Suhuaro is one of many spellings for the common name of this tree-cactus, derived from an Aztecan Indian tongue.

THE NEW YORK BOTANICAL GARDEN

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MEMBERSHIP IN THE GARDEN

Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia twice a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

The classes of membership and types of benefaction are as follows:

Annual Member	annual fee	$ 10
Sustaining Member	annual fee	25
Garden Club Affiliation	annual fee for club	25
Fellowship Member	annual fee	100
Member for Life	single contribution	250
Fellow for Life	single contribution	1,000
Patron	single contribution	5,000
Benefactor	single contribution	25,000

Contributions to the Garden may be deducted from taxable incomes. The following is a legally approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

August, 1939

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Cover Photograph by Fleda Griffith

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SERVICE TO VISITORS

Probably half a million people in a year come to The New York Botanical Garden just for the joy of seeing the outdoor flowers, the trees and shrubs, and the conservatories. Many come for definite information, some of which they can obtain through their own observations. Others a surprisingly large number of whom are artists and authors—have questions to ask on botany or horticulture, including what books to read, how and where certain economic crops are raised, what plants are poisonous, where to go to school, what flowers and food-plants grow in some far-off country, not to mention the plants the Garden is asked to identify and the garden troubles it is requested to diagnose.

Quite outside of its own scientific research and its direct assistance to other botanists and students, the institution thus has for its public many services, some esthetic, others eminently practical. And besides the daily stream of visitors, there are the people enrolled in courses, those who attend the lectures, and all who keep the Garden's mail and telephone busy with replies to questions which staff members are especially fitted to answer.

It is within the memory of many people active today when there was no botanical garden in New York There were no vast rolling acres planted with trees from the temperate belt around the world, no fine collections of shrubs and flowering herbaceous plants; no large conservatories where exotic plants could be seen the year around; little source of authentic information—outside of Columbia—where the plant-lover could go to learn and to have his questions answered.

Then, about forty years ago, The New York Botanical Garden began to be developed on the west side of Bronx Park.

It is refreshing to look about the grounds and buildings today, then to look back upon the vision of the founders, who decreed that The New York Botanical Garden should be created for the purpose of: "establishing and maintaining a botanical garden and museum and arboretum . for the collection and culture of plants, flowers, shrubs, and trees, the advancement of botanical science and knowledge and the prosecution of original researches therein and in kindred subjects, for affording instruction in the same, for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation, and instruction of the people."

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Roses

By Pearl S. Buck

(Address given at The New York Botanical Garden, June 6, 1939, at the unveiling of the plaque to Mr. Lambertus C. Bobbink.)

(Copyright 1939 by Pearl S. Buck)

I AM here today primarily as a token of gratitude for roses. It is folly for a lover of flowers to speak of a favorite flower, and yet I must confess it, that I who love every flower that blooms, love, most of all, roses. For a rose is something more than just a flower. It has become a symbol of beauty and of feeling.

And in this day when one must speak for so many who are in trouble and distress, for the wounded and orphaned in China and Spain and the destitute and exiled from Germany and Italy, for all those who suffer as the result of man's brutality and madness, it restores the soul to come and speak for roses. It is well in the midst of a world like ours to remember that in places such as this, where we gather today, there are roses. I am happy to say I have a rose garden of my own, neither so large nor so beautiful as this one, and yet satisfying to me, because my roses like to grow and bloom. I am proud of that. Roses will not grow for everyone. There is a touch which they demand and an atmosphere which they need for their life.

But I have more than present gratitude for roses. They have a peculiar place in my memory. Indeed, my very first memory is of roses and my mother among them in a little garden she had in a Chinese courtyard in a city of far-interior China. Perhaps I was three—I don't know—not much more, and moved by my mother's enthusiasm for the roses, I smelled a large one growing at about the height of my face. It was full of dew, and I came out of it all but drowned, yet so enchanted by the experience that I still remember it.

My next strong memory of roses is of a white climbing rosebush, old and huge, that sprawled over the end of the porch of the bungalow where I spent

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my childhood. Beyond that bungalow was the great Yangtse River and a crowded city. But our little house stood on a hill outside the city wall, and the rose was fragrant -a tiny, spice-smelling little white rose, one of the Banksias, I now know. But then it seemed only a snowy mass of fragrance. And my mother's Chinese friends would come and pick little clusters of the flowers and put them in their hair. And I remember that year after year a wood-dove built its nest in that rosebush.

". . . . . all the roses heart could wish."

Well, the years passed with their troubled times of the Boxer Rebellion and later into the First Revolution, difficult years, full of wars and threats and dangers. Then my mother's rose garden was a retreat and a place of peace. While we waited for dreaded hours to come, hours, perhaps, of enforced escape or even death, we went into the rose garden and found stillness there and beauty within when there was none without our walls.

And my own first rose garden was in a little country town in North China, in a soil so dry and barren that only the hardiest rose would grow there. It

was the soil which made famine for the people who tried to live upon it - war-torn soil, too. My rose garden grew in the shade of a city wall centuries old and more than once bullets flew over it when bandits attacked our town. I remember only two roses grew willingly in that soil—one a big pink rose from Shantung, which had a handsome bud and when it was opened looked as big as a peony, and the other a small-leaved climbing rose that put out sprays of lemon-yellow flowers, half double and half single. Neither rose had fragrance, only color. Strangely enough, I find the yellow rose blooming also upon many an old farm in Pennsylvania, and it grows in my own rose garden there, its yellow blossoms against a wall built before the Revolution.

And then for a dozen years and more I had all the roses heart could wish, for I lived in Nanking, that capital of new China, where in the midst of struggling governments and clashing armies, I planted a rose plot in rich mid-China soil. Those roses grew in a climate they loved, in moisture created by the nearness of the Yangtse again and in the richly fertilized river lands. I could there grow every kind of rose, and I had them, from the highly cultivated English and American varieties, to the commonest small fragrant red Chinese rose. My Chinese friends shared with me that garden friends I knew and friends I didn't know. Often in the street I saw in some woman's dark hair one of my roses, plucked by some unknown means, having passed through who knows how many hands since it left its place in my garden They always loved red roses best, and cared more for fragrance than for size or shape. When finally the Revolution of 1927 drove us out and I left my garden expecting never to see it again, it grew on for two years with no care. I did see it again. I came back, and there the roses were—not all of them, for secret rose lovers had stolen some of my best bushes and all the red ones. But I did not mind that theft, if somewhere they were blooming for someone.

Everywhere my rose gardens were places of comfort and peace and refreshment, even though often when I picked buds in the cool of morning, I was not sure I should be there to see them bloom, so disturbed were those times by wars.

But roses have always been to me comfort and peace and refreshment. They are now. In a world such as ours it is well to take time to think about them, to grow them and tend them and persuade them to bloom. They belong to an essential realm, and when we come here, as we do today, to give honor to a man who has spent so much of his life upon roses, we do well. For I believe that his work in the creation of roses, like the work of those who make music and painting and books and poetry and sculpture, is part of all that work which makes human beings better and more civilized.

Folklore And Fact Of Medicinal Plants In Rural Mexico

By Ira L. Wiggins,
Stanford University

THE ingenuity with which some of the rural Mexicans utilize their native plants for remedies and cures is surpassed only by their ability to distinguish between those that are "good" or "bad" and to apply names to most of those with which they come in contact.

Often, while collecting herbarium specimens in Mexico, I have been looked upon with unconcealed suspicion and wonder; but when the natives were told that I was seeking plants that might yield new or more effective medicines their uneasiness vanished at once. A man putting weeds and brush between pieces of paper was loco—crazy as a loon—but there was less of a question concerning the sanity of one who was looking for medicines! Spectators usually then became freshets of "facts," and no further pumping was necessary.

Doubtless my notebooks contain no small amount of misinformation concerning the supposed beneficial effects of various native plants when eaten, smoked, chewed, rubbed on, or made into poultices, plasters, or tea. On the other hand, the medicinal lore of the Mexican peon and Indian is based on generations of experience, handed down from father to son and from mother to daughter. Though intimately intertwined with superstition, a remarkable web of truth runs through the fabric. Not a few of the plants used by the Mexicans today as homely but effective remedies for common ailments were at one time used also by our own grandparents. That we have supplanted them with refined drugs obtainable at the corner drugstore detracts not one whit from their effectiveness.

Mexicans in various walks of life have told me that the leaves of one plant make good poultices for a wound that fails to heal readily; that the bark from another bush steeped in water yields an efficacious medicine for the treatment of sore eyes; that the bruised foliage of a delicate little herb is an excellent remedy for the bite of a rattlesnake or the sting of a scorpion; that the root of another alleviates toothache, and a decoction made from still another is a potent remedy for malaria! A tea made from the leaves or flowers of *Isomeris arborea* is a powerful emetic and purgative—but it must be adminstered with care, for an overdose is poisonous!

A decoction of the rush-like stems of *Ephedra californica*, one of the species known to the Mexicans as "canotilla," is used to combat head colds, congestion in the chest and as a remedy for varicose veins. A stronger tea made from the roots of the same plant is used as a remedy for venereal

disease and rheumatism. The juice of *Jatropha cinerea*, "lomboi" of the Mexicans, is reputed to be the most effective medicine known for healing chapped or sunburned lips—but it must not be swallowed as it is a violent

Quaking aspens, whose bark and leaves helped to set the broken leg of a Mexican vaquero.

purgative. The herbage of an evil-smelling *Porophyllum* is used to make a tea taken as a "blood purifier." One informant told me that this tea is quite as palatable as our sassafras tea. The aromatic gum of several species of *Bursera* is burned, much as the Chinese burn incense, and the smoke therefrom inhaled to relieve catarrhal congestion in the head. The same gums are used also for packing cavities in decayed, aching teeth.

Artemisia Dracunculus, called "dragon sagewort" in parts of the United States and "yerb' anís" by the Mexicans, is used for a half dozen ailments. A strong brew made from the leaves is used as a hair tonic, or the green leaves are crushed and rubbed through the hair and over the scalp. The Mexicans claim that this treatment will retard falling of the hair, and in many instances will stimulate its growth. A similar decoction made from the leaves and younger stems is taken in smaller doses to cure stomach ulcers and other digestive maladjustments. Tea made from the fresh or dried roots of the plant is supposed to cure dysentery and relieve the pain of severe burns.

This list of medicinal uses to which some of the native plants are put is but a beginning. It might be extended to include several hundred native plants. Some of the accounts dealing with these plants and remedies sound very reasonable, others quite impossible. It would require years of careful study and checking to verify the effectiveness of some and the uselessness of others, but each new trip into the back country of Mexico brings to light some additional bit of medicinal lore. The most intriguing of these was recounted for me by a sixteen-year-old boy of Scandinavian parentage who now lives in Lower California. During a pack and saddle trip that looped the Sierra San Pedro Martír, crossed El Valle de la Trinidad, and ran northward in the Sierra Juarrez to Laguna Hanson, this boy, Phil Meling, who accompanied the party as packer and guide, told me the following story.

A year ago last summer one of Meling's vaqueros was caught under a falling horse while chasing wild cattle and his leg was broken just below the knee. He was carried to the summer cabin by the other riders who rendered aid—first, second, and final. They first determined that the break was a simple one, then dispatched one of their number to the upper end of the meadow a half mile away to hack a quantity of bark from the trunks and to strip a hatful of leaves from the twigs of quaking aspens growing there. The leaves and bark were placed in a large kettle, a little water added, and the mass boiled for a half hour. The injured leg was carefully washed with the hot liquid. A couple of quarts of the fluid was drained from the macerated leaves and bark, a similar quantity of strained wild honey added, and the mess boiled until it reached the consistency of thick glue. Probably the honey scorched during the process in spite of constant stirring, and the juice may have undergone some oxidation, for by the time it had boiled down sufficiently the mixture was black as tar.

Strips of cloth were torn from a blanket and thoroughly smeared with the hot, viscous mixture. Then, while three vaqueros held the patient, a fourth pulled the broken leg straight and held it in the proper position—as judged by his ideas of human anatomy and those of the assisting riders. The hot, honey-daubed strips of cloth were wound around the injured leg from ankle to above the knee. The patient, protesting that the hot bandage was *too* hot, was held in the bunk until the mass of cloth, honey, and aspen decoction cooled and hardened in a fairly rigid cast. According to Phil's account the cast was comparable, in rigidity though not in color, to those made by surgeons who use cloth impregnated with plaster of paris and dipped in water just before application. A splint, fashioned from a dry piece of aspen wood, was padded with fibers from a native yucca and bound in place outside the cast.

During the month that the Mexican rider was confined to his bunk no weight was attached to the injured leg, nor were any mechanical appliances other than the cast and splint used. At the end of that time the chap became so impatient, that, in spite of admonitions to leave the cast alone for a couple of weeks longer, he went to work on it with his knife and removed the whole thing. He complained bitterly about the minor scars caused by the burns incurred when the hot bandages were placed on his leg! For two or three weeks after the removal of the cast he hobbled about the cabin on improvised crutches, a rawhide thong running from his ankle upward and around his neck to hold the injured member off the ground.

Crude as these measures seem to those who are accustomed to modern medical practices, they were effective. Ramon still rides. He walks (when he must walk) without a limp. Cattle-camp surgery, wild honey and aspen juice made it possible.

Another Krubi From Sumatra Blooms At The Garden

THE Botanical Garden's second specimen of *Amorphophallus titanum*, which has come to be popularly known by the native name of "krubi," came into flower in the main conservatories on Sunday afternoon, July 2. It started to open at 1 o'clock and it developed so rapidly that by the time the conservatories were closed for the day, the rim of the spathe had already begun to droop. The inflorescence remained, however, in fairly good condition for the many hundreds of people who came to see it on Monday in response to newspaper notices and radio broadcasts. But by the Fourth of July the inflorescence was practically closed.

Instead of being set in a tub, like the preceding specimen, this Amorphophallus had been planted out in a bed in the aroid house to give it a better chance to develop. According to B. A. Krukoff, who brought this corm to the Garden from its native home in Sumatra, the plant is largely propagated in the wild by the formation of corms at the ends of runners which extend about ten feet away from the parent plant. As no plant has ever been successfully propagated in cultivation, the Botanical Garden has hoped that its method of culture might induce propagation by natural means.

Since reaching New York in 1935, the present plant has borne two leaves, one during 1936 and the second late in 1937. This one died down during the winter of 1938 and the corm was allowed to rest.

When planted out in the spring, the corm weighed only 31 pounds, barely a quarter as much as the corm of the enormous plant which flowered in June, 1937. It was therefore not expected that flowering would occur for several years.

The new growth began May 5. Six weeks later it became evident that the bud scales contained an inflorescence. By June 20 the bud stood 20 inches high. It then grew an average of about 2 inches a day until it flowered at a height of 4 feet—less than half the size of the former specimen at the Botanical Garden, but a striking "flower" nevertheless, in color, form, and odor.

The spadix of this specimen was of a purplish slate color, instead of yellow as in the former "flower." It did not split down the side, but instead emitted its putrid odor through a pore at the very tip. The inside of the fluted spathe was rich maroon, like the other; the outside a greenish yellow spotted with ivory, above a thick, dull green stalk with ivory spots.

Official Flower

Since the blooming of the second krubi at the Garden, the Borough President has designated *Amorphophallus titanum* as the official flower of the Bronx. In an announcement made July 7, President James J. Lyons said in part:

"*Amorphophallus titanum* (giant krubi) is the world's largest flower. The only place in the Western Hemisphere where this giant krubi has bloomed has been in the Bronx. I, therefore, feel it proper that the Bronx should adopt it as its official flower. I, therefore, proclaim the *Amorphophallus titanum* (giant krubi) as the official flower of the Bronx, as its tremendous size shall be symbolic of the large and fastest growing borough of the City of New York. There are many other sweeter-smelling flowers, but none as large and distinctive."

Photograph by Fleda Griffith.

Amorphophallus titanum, Sumatra's giant krubi, the second specimen of which (shown above) bloomed at the Botanical Garden July 2.

Plants And Planting Methods For The Native Garden

By Robert S. Lemmon,
Editor of "Real Gardening"

TO a very considerable extent, success in the growing of native plants in a more or less cultivated state hinges on the application of plain common sense, plus the realization that the great majority of the more desirable species have definite likes and dislikes to which one must defer. Granted these qualifications on the part of the planter, the rest becomes largely a matter of details.

At the very outset you should make a thorough study of the place you propose to work with. Obvious points to be determined are the extent and location of the shaded and sunlit areas, the conditions of soil moisture in various spots, the presence or absence of rock, and the character of the soil itself. The last of these is especially important and deserves a paragraph or two of its own.

Both the physical and the chemical character of the soil may vary sharply in different sections of even a decidedly small area, and the only way of determining them is by taking numerous samples. Look especially for the presence of heavy clay, sandy or gravelly consistency, abundant leafmold or other humus, ordinary loam, and so on. If any one of these conditions is found in excess it can be altered, if desired, by incorporating with the soil sufficient material of an opposite character to bring it up to the required standard. A very great many native plants are decidedly particular about the physical type of the soil in which they are planted, so it is best to familiarize yourself with these matters in the beginning.

The presence or absence of either lime or tannic acid is the principal side of the soil chemistry picture which counts, for the others, which have to do with the actual plant food content, will generally be found to be satisfactory except in the case of an extremely barren location. Certain of our really fine native plants are indifferent as to whether a soil is alkaline or acid; some definitely prefer the presence of considerable lime, and many other species (especially natives of the East) require clearly acid conditions.

There is only one sure way of determining the alkalinity or acidity of your soil, and that is by testing samples of it with one of the several reliable sets which can be bought at the larger garden supply houses or direct from the manufacturers. Such tests had better be made in numerous different spots, for the chemical as well as the physical character of soil often varies within decidedly short distances.

Once the existing alkaline or acid condition is known, steps can be taken to alter it if the plants that you wish to grow call for such changes.

A limey soil can be made neutral or actually acid by the addition of acid-carrying materials such as oak leafmold, peatmoss, rotted hemlock or pine needles, or by the cautious use of aluminum sulphate. An acid soil, on the other hand, can be neutralized or thrown over on the alkaline side by digging in crushed limestone or, as a substitute, ordinary slaked lime.

Turning now to matters of shade and sunlight, it is well to remember that few of our really worthwhile native plants will do their best if subjected to conditions which are much different from those under which they grow in the wild. Woodland species simply cannot stand the full blaze of the summer sun, and conversely the open-country dwellers will become but ghosts of their true selves if obliged to submit to deep shade.

Similarly, too, plants that normally are found in wet or damp soil will be unhappy or even die in dry situations, and *vice versa*. There are but few clear exceptions to this principle, notably the cardinal-flower (*Lobelia cardinalis*) and the marsh-marigold (*Caltha palustris*), two of our best eastern wildflowers, both of which grow very well indeed in locations considerably drier than those in which they are ever found naturally.

The sources from which the plants themselves are to be obtained is of obvious importance. You can yourself collect some of the more abundant (and often very desirable) species without violating the principles of good conservation, and others can be bought from dealers who specialize in such material. But in many, many cases—particularly those which involve the rarer and sometimes more difficult kinds—plants which have been propagated and grown under cultivation will not only give you better results than can be expected from collected ones, but also conform to perfect conservation practice.

A few of the nurseries offer propagated specimens of some of our native plants, but if you are looking for any considerable variety you will find it more certain—and far more interesting—to raise your own from seed, by division, or sometimes from cuttings. All three of these methods follow the same general rules by which our ordinary garden plants are produced, and the equipment required is so simple that no real gardener need hesitate a moment about the undertaking.

A small coldframe with a regular sash and a slat screen for shade is the first essential for raising native plants from seed, for many kinds germinate slowly and must be protected from full exposure to the weather over the winter as well as through the rest of the year. A soil mixture of one part leafmold, one part loam and one part sand is a good standard to follow, and the sowing should be done in shallow wooden boxes, or "flats," rather than clay containers, as they will not crack during cold winter weather. In general, seed may be sown as soon as it is ripe, regardless of the time of year, for the wisest policy is to follow Nature's lead, merely removing her own obstacles such as extreme drought or wetness, storm damage, smothering by other plants, and so on.

Aster linariifolius

Gentiana Porphyrio

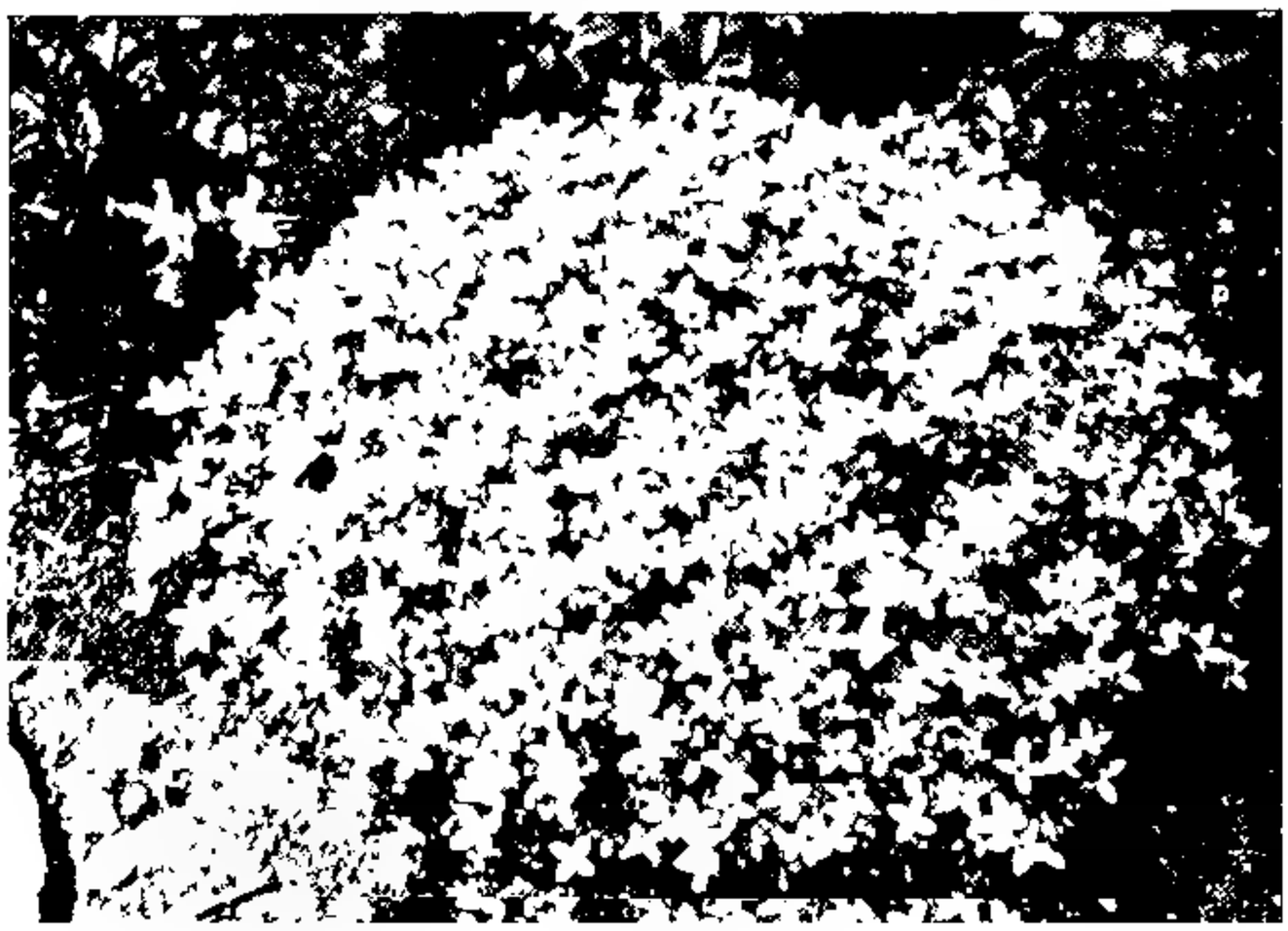
Houstonia caerulea

Erythronium americanum

Photographs by Robert S. Lemmon

(At left) Polygala paucifolia

(Below) Houstonia serpyllifolia



Epigaea repens

Cimicifuga racemosa

Cypripedium Reginae

Claytonia virginica

AMERICAN WILD FLOWERS FOR THE AMERICAN GARDEN

(Below) Iris cristata

In a good many cases, shrubs and other woody plants can be produced from cuttings in a similar frame if it contains a bed of rather coarse sand five or six inches deep in which the cuttings can be set to about half their depth. Watering must be done regularly and often, and the sash kept on at all times to prevent undue evaporation. Directions for making and handling cuttings as given in any of the standard books on nursery practice are good guides to follow, except that you will not have the advantage of the "bottom heat" which is generally recommended.

Against the background of such general considerations as these which we have been discussing the question of what kinds of plants to select for your particular property comes next in importance. How, given a certain set of soil and other conditions, are you to know which species will do best for you?

Of course, the ideal answer to this all-important matter is long experience with and observation of native plants and their natural habitats, but that takes time. A very satisfactory short-cut exists in Herbert Durand's "Wildflowers and Ferns" which, though not a very recent book, is still the best one on the cultivation of our eastern native plants that I know of. If you supplement it with the following notes on certain species you will have a working knowledge of native plant gardening that will lead to real success.

There is no space here for anything like a comprehensive list of the kinds of plants that are available and really desirable. Those which are described, however, are among the best, and they represent a fairly wide variety of cultural requirements. All have proved perfectly hardy and satisfactory in the New York region, and every one has definite and distinctive appeal of blossom, form, or character that entitles it to first-rank consideration.

For Full or Nearly Full Summer Shade

Low Growing (Under 18 inches)

Partridge-berry (*Mitchella repens*). Dainty evergreen trailer for dry or dampish places, neutral or acid soil. Exquisite though tiny fragrant white flowers in late June followed by persistent scarlet berries. Not a rapid grower. Propagated by cuttings or layers.

Gaywings (*Polygala paucifolia*). Slowly forms a scattering ground cover 2 to 4 inches high in very acid, average to quite wet soil. Amazing orchid-colored flaring flowers in May. Inclined to be sulky, but pot-grown plants from root divisions are not too difficult to establish. Good-sized collected sods will usually succeed in the right place.

Windflower or ***Rue Anemone*** (*Anemonella thalictroides*). Charmingly dainty little woodlander 4 to 6 inches high, white to pale orchid-colored flowers in early May; leaves resembling those of meadow-rue. Very acid soil and good drainage. Propagate by root division.

Wood Anemone (*Anemone quinquefolia*). Flowers always white and leaflets pointed, but general appearance similar to the foregoing and a good companion for it. Root division is probably the best means of propagation.

Hepatica (*H. triloba*). Blue, white or occasionally pink flowers on furry stems in early spring. Altogether delightful in well drained, leafmoldy, neutral to acid soil, but should not be moved when once

established. Propagate by fresh seed (uncertain) or division of large plants.

Troutlily (*Erythronium,* various species). From 3 to 5 inches high. Spring bloomers from deeply buried bulbs, for leafmoldy, neutral to acid, preferably damp soil. Only fully matured bulbs flower well. The yellow eastern species (*E. americanum*) spreads underground to form large patches, chiefly of foliage. Several West Coast species are less rampant and more showy, with different colors.

Trailing Arbutus (*Epigaea repens*). Prostrate evergreen, with intensely fragrant white to pink blossoms in early spring. Very acid, well drained, leafmoldy-sandy soil. Only pot-grown plants from seed or cuttings should be used, as collected clumps rarely succeed.

Canada Mayflower (*Maianthemum canadense*). Splendid low and fast-spreading ground cover for very acid soil, either dry or damp. Tiny spires of cream-white flowers in May. Easily transplanted, or propagated by division of horizontal roots.

Oconee-bells (*Shortia galacifolia*). Choice little broad-leaf evergreen from the Southern Appalachians, with white fringy blossoms in late April. Intensely acid leafmold that is never allowed to become really dry. Difficult to establish but very fine. Propagate by stolon division.

Maidenhair Fern (*Adiantum pedatum*). Handsome horizontal fronds at the top of slender, wiry stems. Rich leafmold and plenty of moisture, but well drained. Easily collected, or can be propagated by division or spores. Grows from 8 to 18 inches tall, depending on conditions.

Dutchman's Breeches (*Dicentra Cucullaria*). Masses of delicate, much-divided foliage and creamy early flowers suggestive of the related bleeding-heart in shape. Well watered, preferably stony slopes and neutral to acid soil. Propagate by division of small bulb clusters. Easily transplanted after leaves die down.

Bloodroot (*Sanguinaria canadensis*). Showy white flowers in very early spring, followed by large leaves. Well drained soil, dry or damp, neutral or acid. Propagate by division of root-stock in August, or transplant at the same season.

Spring Beauty (*Claytonia virginica*). A rather inconspicuous, straggly little plant as it grows among the fallen leaves of trees in early spring, but really choice when grown by itself in deep, rich, damp leafmold. Neutral or acid soil. Easily transplanted after foliage dies down.

Early Saxifrage (*Saxifraga virginiensis*). In dry or wet places, on rocks or flat ground, this willing little native with its basal tuft of evergreen leaves is a real treasure in the early spring. Easily transplanted and does not seem to care whether the soil is neutral or moderately acid.

Showy Ladyslipper (*Cypripedium Reginae*). Safer to transplant and easier to grow than its temperamental sister, the stemless ladyslipper. Enjoys abundant leafmold or peat in the soil. Propagated by division of the plants in spring, when they are old enough to have formed extra eyes, or buds. Also called *C. spectabile.*

Trillium (*T. erectum, T. nivale, T. stylosum, T. grandiflorum*). These are but a few of the thoroughly fine members of this unappreciated family. They all like a rich, leafmoldy and well drained soil and flower in early or mid-spring. *T. nivale,* very early and dwarf, apparently prefers an alkaline soil; the others listed here don't seem to care much. Propagate by fresh seed (slow), or transplant from the wild in fall.

Virginia Cowslip or ***Blubells*** (*Mertensia virginica*). Handsome, pink-tinged blue flowers on leafy stalks, in rich, dampish, neutral woods soil. Propagate by fresh seed or division of large clumps.

Foam-flower (*Tiarella cordifolia*). Fine low ground-cover with broad, somewhat leathery evergreen leaves and small spikes of creamy blossoms. Give it a dampish and rich soil, neutral or acid. Readily transplanted from the wild or propagated by division.

Tall (18 inches to 6 feet)

Cardinal-flower (*Lobelia cardinalis*). The reddest of all reds, in August, to 4 feet high in rich, heavy soil. A wet-ground plant in the wild, but lives longer in cultivation under only moderately damp conditions. Easily grown from seed.

Great Lobelia (*Lobelia syphilitica*). A handsome blue relative of the foregoing, growing well under ordinary garden conditions. Propagates readily from seed.

Black Snakeroot (*Cimicifuga racemosa*). Slender white flower spires in summer, rising to 6 feet or more. A stately, graceful plant in rich, rather damp woods soil, neutral or somewhat acid.

Cinnamon and ***Interrupted Ferns*** (*Osmunda cinnamomea* and *O. Claytoniana*). Two stately and tropical-looking species that eventually form large clumps in rich, well watered soil. Moderate sized ones can be transplanted in late summer, or new ones raised from spores.

Royal Fern (*Osmunda regalis*). A truly "royal" species for a waterside location, sometimes 4 feet high and proportionately broad.

Native Plants for Half Sunny Locations

Low

Eastern Columbine (*Aquilegia canadensis*). Beautifully graceful and attractive in dryish locations and lean, neutral soil. Avoid rich soil, as it leads to overgrowth and coarseness. Easy from fresh seed.

Mountain Cranberry (*Vaccinium Vitis-idaea minus*). Very choice, very low, woody evergreen alpine for gritty, peaty, acid soil and moderate moisture. Slow-growing. Cranberry-red fruits. Propagate by division or seed (slow and uncertain).

Violet Iris (*Iris verna*). Dainty dwarf spreader, Light blue and gold flowers in May. Acid soil. Divides easily.

Sand Myrtle (*Leiophyllum buxifolium* and *L. b. prostratum*). Two forms of a tiny-leaved evergreen sub-shrub, the former bushy and upright, the latter prostrate. Both have clusters of fuzzy pinky-white flowers in May Acid, peaty, well drained soil.

Pine Barren Gentian (*Gentiana Porphyrio*). A rare, light sky-blue species, truly perennial, not over a foot tall. Very acid, sandy peaty soil. Nursery plants from seed are best.

Creeping Bluet (*Houstonia serpyllifolia*). Flat, tight, spreading cushions of tiny leaves hidden by china-blue blossoms for three weeks in May. Acid, well drained soil. Propagates easily by division.

Quaker Lady (*Houstonia caerulea*). Similar in general effect to the bluet preceding, but much smaller clumps. Not long lived, but self-sows freely when well situated Same conditions as for *H. serpyllifolia*.

Wintergreen (*Gaultheria procumbens*). Splendid evergreen ground cover to 6 inches high with persistent scarlet berries. Very acid, dry location. Propagated by cuttings or division.

Tall

Cardinal-flower and ***Great Lobelia.*** Already described.

Bottle Gentian (*Gentiana Andrewsii*). Odd, but effective when a good deep blue form is selected. Sometimes 2 feet high in rich, fairly damp and heavy soil. Propagate by seed or division. When transplanting, dig deeply to get roots.

Mountain Laurel (*Kalmia latifolia*). Too well known to need description, but many people are not familiar with its insistence on a strongly acid soil. This, too, is a requirement of those other most desirable shrubs, the ***Carolina Rhododendron, Pink-shell*** and ***Flame Azaleas***, and *Rhododendron catawbiense*.

Wildlings to Plant in Full Sun

Low

Birdsfoot Violet (*Viola pedata*). Reputedly difficult, but really perfectly simple if given full sun, perfect drainage, and a very acid, sandy soil. Propagate by division of large plants, or by seed.

Crested Iris (*Iris cristata*). Attractive spreading dwarf plant for almost any soil. A dry location tends to increase compactness.

Bristled Aster (*Aster linariifolius*). Splendid show of lavender, gold-centered blossoms in September. Dense growth to 15 inches high in acid, perfectly drained soil. Propagate by division.

Bearberry (*Arctostaphylos Uva-ursi*). Outstanding evergreen ground-cover for

dry exposures. Perfect drainage essential, but not acidity. Plenty of sand. Only nursery-grown potted plants advisable.

Eastern Columbine. Already described.

Tall

New England and ***New York Asters*** (*Aster novae-angliae* and *A. novi-belgii* and their forms). Both tall and very showy, at their best in deep, rich loam. Should be divided every two or three years.

Marsh Mallow (*Hibiscus Moscheutos*). Great crêpe-paper pink blossoms in August on stalks up to 6 feet tall. Dampish location and heavy soil preferred. Easy from seed.

Meadow Rue (*Thalictrum polygamum*). Fluffy summer clouds of creamy white blossoms. Succeeds almost anywhere and transplants readily.

With Captain F. Kingdon Ward (center) in the Thompson Memorial Rock Garden are, left to right: J. J Elliott, T. H. Everett, H. A. Gleason and L W. McCaskill.

Captain F. Kingdon Ward Visits New York, the Fair, And the Garden

Coming to the United States as the guest of C. Suydam Cutting, with whom he has explored in Tibet, Capt. F. Kingdon Ward, British explorer and plant-hunter, made two visits last month to The New York Botanical Garden and was accompanied by members of the staff to several estates around New York, notably places where plants are grown which he introduced from Asia.

On July 17 he was guest of honor at Botanical Day at "Gardens on Parade" at the World's Fair. The botanical gardens of Brooklyn and New York cooperated and during the afternoon and evening The New York Botanical Garden conducted a clinic at which staff members answered the public's questions on gardening and botany.

Two days afterward Captain Ward, accompanied by Dr. Robbins and Mr. Everett, went to Millwood, N. Y., to visit the estate of Mrs. Walter Beck and from there to Salisbury, Conn., to see the gardens of Mr. Joseph R. Swan, President of the Botanical Garden The following day he made a tour of New York City's parks, escorted by Mr. John Walsh, Head Gardener of the Parks Department, and by Dr. B. O. Dodge. On July 31, with Mr. Everett and Miss Elizabeth Hall, he went to the Bayard Cutting estate at Oakdale, Long Island.

During his two visits in New York he was entertained at the homes of Dr. Robbins and Mr. Everett Staff members gathered at Dr. Robbins' home at Colonial Heights, Yonkers, to meet him the evening of July 19.

J. E. Spingarn

J. E. Spingarn, a member of the Board of Managers of The New York Botanical Garden, died at his New York Home July 26 after a prolonged illness. He was 64 years old.

Famed among horticulturists for his work with clematis, he was even more widely known in the field of literature and wherever Negro rights were concerned. Until 1911 he was head of the Department of Comparative Literature at Columbia University, where he had been on the staff since 1899. The author of a number of works on literary criticism, as well as volumes of poetry, he also contributed to several horticultural works, including the Garden Dictionary and Ernest Markham's Clematis. In 1937 he prepared for the Dutchess County Historical Society a long address (which was published in the year-book and then reprinted) on "Henry Winthrop Sargent and the Early History of Landscape Gardening in America." In this he quoted extensively from the diary of the first professional gardener in Dutchess County, an escaped negro slave named James Brown. He hoped to have the entire diary, which sheds much light on people and their modes of living and gardening in the last century, published independently.

Mr. Spingarn (he preferred "Mister" to "Doctor," "Professor," or "Colonel," to all of which he was entitled) was one of America's leaders in Negro welfare. The Spingarn medal, which he established in 1913 to be awarded annually to the man or woman of African descent and American citizenship who has made the highest achievement during the preceding year in any honorable field," was awarded this past summer to Marian Anderson, Negro contralto, in a presentation made by Mrs. Franklin D. Roosevelt.

Serving as a major in this country and abroad during the World War, Mr. Spingarn retained a post as lieutenant colonel in the reserve until the time of his death. He was one of the founders of the American Legion.

At Troutbeck, his estate at Amenia, N. Y., he raised probably every species and worth-while hybrid of *Clematis* that could be grown in this climate, and he did more than anyone else to re-establish this old favorite in American gardens, writing, lecturing, exhibiting, and talking clematis everywhere until he felt that he had made satisfactory progress with the appreciation of this flower. In July 1936 he contributed to this Journal "The Hybrids of *Clematis texensis.*"

He was the 1937 recipient of the Jackson Dawson Memorial Medal of the Massachusetts Horticultural Society in recognition of his work with the genus *Clematis.*

When graduating exercises were held by the Botanical Garden April 26, 1938, for members of the Science Course for Professional Gardeners, Mr. Spingarn was the principal speaker. In this address, in which he emphasized the "ever-increasing dignity of the noble profession of gardener," he spoke with characteristic scorn of the degree of doctor of philosophy—unless it indicated genuine intellectual achievement. "A scientist should be judged," he said, "by his scientific attainments and essential wisdom and not by his degrees."

Mr. Spingarn's appearance before the student gardeners was typical of the keen interest he displayed in the institution from the moment of his appointment to the Board of Managers on Jan. 10, 1938. In the brief period of his participation in Garden affairs, he was an active and constructive associate.

Delphinium Fellowship

For the study of root and crown rot of delphinium, one of the most troublesome of plant diseases, a fellowship has been established by the American Delphinium Society, of which Col. Edward Steichen is president.

Thomas Laskaris, a graduate student at the University of Minnesota, was chosen for the fellowship, and began work August 1 under Dr. B. O. Dodge at The New York Botanical Garden. The appointment is for one year.

At the University of Delaware, where Mr. Laskaris was graduated in 1937, he specialized in horticulture and botany and did both field and laboratory work outside of his courses. Entering the University of Minnesota in 1937, he majored in plant pathology. From 1937 to 1938 he was a Caleb Dorr fellow at Minnesota, and in September 1938 he was the recipient of the Shevlin fellowship in plant pathology and botany. His Master's degree was awarded at Minnesota in November 1938. He is a member of Sigma Xi.

Notes, News, and Comment

Shade Tree Conference. The Fifteenth National Shade Tree Conference takes place in New York Aug. 22-24, with headquarters at the Hotel Astor. In addition to the 25 papers to be given on shade tree problems, there will be practical demonstrations and exhibits of tools, materials, and equipment used in the care of trees. The New York Botanical Garden is showing types of labels for trees used by botanical gardens all over the world.

Europe. Dr. A. B. Stout is spending two months in Europe this summer, traveling for three weeks through the Scandinavian countries, attending the International Genetics Congress in Edinburgh Aug. 23-30, and visiting the Royal Horticultural Society in London during the first week in September, just before his return.

Medal. The third American ever to receive the award, Dr. E. D. Merrill has had the medal of the Linnean Society of London conferred upon him this summer. It was given in special recognition of his authoritative work on the flora of the Orient. Dr. Merrill was made a member of the Linnean Society while he was Director of The New York Botanical Garden.

New Orleans. Marcel G. Montreuil, representing the Park Department in New Orleans came to the Garden July 25 to consult with Dr. Robbins and others on the staff regarding the establishment of a botanical garden in his home city.

Radio. On August 28 at 11:45 a.m., T. H. Everett will appear on station WOR, speaking on "Consider the Annuals" for the Radio Garden Club. He will be assisted by Mrs. W. E. Weber.

Visitors. Among the botanists visiting the Garden in July are Dr. H. J. Lam, Curator of the Herbarium at the University of Leiden, on his way to the Pan-Pacific Congress at San Francisco; Prof. L. W. McCaskill of Christchurch College, New Zealand, en route to England; Mr. R. Rose-Innis of the University of Witwatersrand, Johannesburg, South Africa, on his way to do graduate study at the University of California; Dr. Olga Lakela of Duluth, Minn., going to Finland; T. E. Brooks of Kansas Agricultural College; George E. Wheeler of the University of Pittsburgh; C. V. Morton of the National Herbarium at Washington; R. J. Dobbs, an amateur botanist of Illinois; M. Ashby, Imperial Institute, London; Alan A. Beetle, University of California; Mrs. Walter Douglas, Mexico City; Beryl O. Schreiber, Vegetation Type Map Herbarium, Berkeley, Calif.; Dr. Miriam Bomhard, U. S. Forest Service; T. L. Goei, Semarang, Java; F. W. Portuando, Havana, Cuba; Richard A. Howard, Harvard University; Charles Driscoll, Syracuse University; Malcolm McDonald, University of Iowa; Dr. Edgar T. Wherry, University of Pennsylvania.

Golgi Elements. Dr. Laura J. Nahm of the Junior College at Flat River, Mo., has been spending two months at the Botanical Garden preparing a paper for the *Botanical Review* on the Golgi elements of plant cells.

Vacation Trip. Habitat-hunting in the southeastern states was the object of the vacation trip of Ralph Pinkus, arboretum foreman, and Philip Chandler and Joseph John Elliott, exchange student gardeners, under the leadership of E. J. Alexander the last of June. They covered Pilot, Grandfather, and Roan Mountains and the Craggies and also spent a week along the North Carolina coast.

Daylily Day. As the culmination of Daylily Week the last of June, a program was given in the Museum Building the afternoon of June 30, with Col. Edward Steichen, Chairman of the Daylily Committee of the American Amaryllis Society, presiding and giving an address. Dr. A. B. Stout gave an illustrated lecture on daylilies, showing some of the wild forms and some of the newest developments in color, size, and blooming quality. Paintings of daylilies were shown in the corridor outside the lecture hall.

Correction. In the article on the "Fundamentals of Rose Growing" by P. J. McKenna, in this Journal for June 1939, a correction should be made in the suggestions under *Feeding and General Maintenance.*

The statement advising the use of tankage or dried blood should be corrected to read: Apply at the rate of *1 pound per 3 square yards.*

Current Literature At a Glance*

By Virgene Kavanagh

Chemicals. The Proceedings of the American Society for Horticultural Science, Vol. 36, 1938, contains reports of a number of experiments on chemical treatment of plants. Among them the following results have been recorded.

Root-forming substances had no advantage in blueberry propagation (Johnston) but indole-3-butyric acid was beneficial, especially when applied in lanolin, to transplanted pecan trees (Romberg and Smith).

A triploid peach seedling was found among a group that was being subjected to heat and cold treatments, and a mutant, probably a sectorial tetraploid-diploid, was found in a group treated with colchicine (Dermen and Scott).

Tetraploid and 16 ploid strawberries were induced with colchicine treatment (Dermen and Darrow).

Tetraploid lettuce followed colchicine treatment. The plants have considerable commercial promise. (Thompson and Kosar)

The effect of "auxilin" on the rooting of cuttings of shrubs varied with the age of the cutting as well as with the species. The rooting of leaf-bud cuttings of *Syringa japonica, Prunus Padus, P triloba plena* and *Rubus deliciosus* was not affected, but *P hybrida*, Newport plum, *P tomentosa, Rhodotypos kerroides* rooted better, and *Sambucus racemosa laciniata* rooted much more easily with "auxilin." Stem cuttings of *P. Padus, Ribes alpinum variegatum* and *P. triloba* showed increased rooting. (Longley).

Seedless watermelons, cucumbers, and peppers were formed when naphthalene acetic acid was applied to the stigmas of the flowers in place of pollen. The number of fruits and the quality of the fruit was about the same as with self-pollination except for the absence of seeds. A cholchicine-treated watermelon failed to develop fruits after self-pollination but did develop with the naphthalene acetic acid treatment. (Cheong-yin Wong).

Fruits. Some of the other work reported last year by the members of the American Society for Horticultural Science included experiments on fruits.

From 28 to 80 percent of the pollen of apricots, apples, cherries, peaches, pears, and plums which had been kept for 550 days germinated in sugar solution. (King and Hesse).

The ascorbic acid (vitamin C) content of Florida orange juice varies somewhat with the season; it is as great in immature as in mature fruits, but is less in overripe ones, and averages about 50 milligrams per 100 milliliters. Oranges exposed to the sun contained more vitamin C than those grown in the shade. (Harding, Winston and Fisher).

The University of Illinois has kept records on the performance of three trees of each of 96 varieties of apples for 21 years Of these varieties, the ***Dudley*** began bearing first; the ***Autumn Strawberry*** bore 50 pounds of apples per tree first; and the ***Fameuse*** yielded the greatest number of pounds of apples. Of the varieties bearing young and making good yields, ***Dudley, Dr. Mathews, Autumn Strawberry,*** and ***Ingram*** showed no injury due to fire blight or wintering. (McMumm).

Orchids. Mrs. Marjorie T. Bingham has just written a charming brochure on the orchids of Michigan, which will be of interest to orchid fans throughout the northeastern states. She describes fifty-one kinds, illustrates five in color and thirty-one in half-tone and provides a key, a glossary, a bibliography and a general discussion of the family, including notes on the cultivation of the native species; the whole occupying 87 well printed pages. It may be had for a dollar from the publishers, the Cranbrook Institute of Science, Bloomfield Hills, Michigan.

Dwarf Fruits. The uses of dwarf fruit trees, which some commercial growers prefer to the standard trees, are described in U.S.D.A. Leaflet 178, by H. F. Gould. In this country the dwarfs are usually made by grafting the standard varieties onto slow-growing rootstock. These trees are frequently developed for decorative effect as espaliers on trellises or trained into fan shapes against a garden wall.

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* All publications mentioned here and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

How New York City's Parkways Pay

PARKWAYS AND LAND VALUES. John Nolen and Henry Vincent Hubbard. 135 pages, illustrated; appendices. Harvard University Press. Cambridge, 1937. $1.50.

It would be impossible to review this book without being greatly influenced by the rapidly growing parkway development of New York City and without using the data obtainable from a study of this system as a check on the findings of the authors.

The book, which is complete and interestingly informative, deals with three different types of park systems: the Metropolitan system of Boston, which more or less parallels the inter-related municipal and county systems in our own metropolitan region, the Municipal system of Kansas City, and the County system of Westchester. The Kansas City and Boston systems are old, with their inceptions forty years or more ago, while Westchester's network has sprung up within the past fifteen years.

The parkways are discussed in terms that we in New York have come to recognize. The desirability of relating them to topographic and scenic features, their value in connecting separated park areas and reservations, and their regional purpose in providing traffic relief from crowded highways or streets, enabling one to reach his home from his place of business with the least amount of driving strain and with the greatest enjoyment of the amenities; all these factors are stressed.

The authors also discuss the accepted parkway pattern: elimination of grades at intersecting streets or highways; service roads to give frontage to abutting property; separation of opposing traffic lanes; curvilinear alignment which we now regard as the true parkway motif in contradistinction to the mathematical and uninteresting tangents of the highway engineer. The esthetics of the older systems are noted as well: parkway margins developed to provide pleasing offscapes to the passing motorist, and the planning of bridges, gas stations, lighting structures, and the like to be harmonious with the landscape.

From my point of view, the most important point stressed is the axiom that a parkway to be successful must be regulated for the use of pleasure traffic only.

Finally, from the economic standpoint, as evidenced by the title of the study, they have concluded "that parkways, properly designed in their relation to all the needs of a considerable population, will be worth their expense and that their value will be reflected in the taxable values of property so that, in truth, the community *as a business* will be better off financially on account of the parkway because it will ultimately be receiving annually in added taxes more than the annual charge to the community for creating and maintaining the parkway."

That New York City has profited by the older parkway patterns there can be no doubt. That it is now taking the lead in providing the most modern pattern, which will become, upon completion, the finest example in America, if not in the world, there can also be no doubt. In New York City this is the result of co-operation between different agencies of government, with the City providing the rights-of-way, the plans being drawn either by the City Park Department or by an agency of State Government, and the construction undertaken by State or by City, in either case often with Federal assistance. The systems are also integrated and co-ordinated with the approaches to the five great crossings constructed during the past five years by Authorities, which have been set up for the purpose by state legislation and financed by the sale of bonds. In many cases the several Authorities have provided sizable portions of these parkway approaches.

As in the examples studied by the authors, New York City's system has the threefold purpose of providing traffic re-

lief arteries, preservation of natural scenery, and stabilization of land usage.

As a check on the economic value of the parkway, a detailed study was made of the assessed valuation and new building construction in certain areas bordering the Henry Hudson Parkway in Manhattan and along it to Broadway at Van Cortlandt Park in the Bronx. The areas considered were in general within two blocks of the parkway right-of-way. The check was by comparison drawn between the assessed valuations in 1935 and those in 1938, as revealed by the assessment rolls of the City Tax Department.

This parkway, 11 miles long, was built by the combined efforts of City, State, and Federal governments, with the co-operation of the New York Central Railroad in its grade elimination program. The Memorial Toll Bridge over Spuyten Duyvil was constructed by the Henry Hudson Parkway Authority, at a total cost of $4,000,000. The balance of the parkway, including land acquisition by the City, brought the total cost of the project to $35,000,000. Increased assessed valuations attributed to the three-year period of building construction along its margins amounted to $35,500,000. This represents an increase in City tax revenues of slightly over $1,000,000 per year, and as the effect of this new parkway lies not only in stimulation of new building activity but is also reflected in increases in land values along its length, it is reasonable to expect that these taxable values will undergo a further rise.

There are so many factors involved that it is difficult to decide on how much *more* monetary value than is indicated in these tangible figures is added by the parkway. Instead of a provable total determined by use of set formulae, there are indeterminate and intangible values not readily appraisable except by wild guesses.

It is, however, an incontestable fact that parkways pay, not only through the advantages of increased recreational facilities to the residents along their margins, not only in their value in relieving intolerable traffic conditions, but, from a business standpoint, from their effect on the general financial structure of the local government.

ALLYN R. JENNINGS,
General Superintendent of Parks,
New York City.

A Fine Wild Flower Book For Young People

A BOOK OF WILD FLOWERS. Margaret McKenny and Edith F. Johnston. 33 full-page illustrations in color. Macmillan, New York, 1939. $2.

Margaret McKenny and Edith F. Johnston in this small volume have succeeded in producing a beautiful and charming book that, while it is intended primarily for children, could not fail to delight the layman who loves flowers and would like to know more about them, but who is often frightened off by long botanical names. Obviously Margaret McKenny knows and loves her flowers and Edith Johnston knows how to draw them exquisitely.

ANNA B. MCKENNA.

Soil Study for the Layman

MOTHER EARTH. Gilbert Wooding Robinson. 202 pages illustrated with photographs and maps. Thomas Murby & Co., London, 1937.

Unique in its compilation is the little book "Mother Earth" by G. W. Robinson, an English Professor of agricultural chemistry. Containing some 200 pages, it is composed of a series of letters, each letter corresponding to a chapter in the text. In reality it is a story of the soil written in an interesting and informative way and with the practical viewpoint of one who thoroughly understands the soil and its complex processes without bordering too much on the scientific. The author discusses such problems as soil structure, humus, moisture, soil fertility and soil profile in an intimate and at the same time practical manner.

Some references to soils in the tropics and other parts of the world and a chapter on the struggle of the United States to conserve its soils round out a rather useful little work.

P. J. MCKENNA.

Research on Fertilizers Brought Up to Date

COMMERCIAL FERTILIZERS. Gilbeart H Collings. Second edition. 456 pages, index and bibliography. Blakiston, Philadelphia, 1938. $4.

The author has an extensive knowledge of the research in the field of commercial fertilizers. Throughout the book, this is

indicated by constant reference to, and concise résumé of, the work of investigators connected with experiment stations and the fertilizer industry. The bibliography is long and comprehensive. It includes the record of the research of many workers in the United States and a considerable number in England, Germany, France, New Zealand, Japan, and other countries.

The second edition, under date of 1938, has brought the analysis of this research down to date. "Thus," as the author states in the preface, "this book represents a composite of the opinions and conclusions of authorities within the fertilizer industry, as well as the conclusions of experiment station agronomists, especially in the fertilizer-using territory of the United States."

The content, for the most part, is quite technical. In order to follow the thought adequately the reader should be familiar with the vocabularies and basic ideas of such fields as agronomy, botany, chemistry, geology and soils.

Most of the book is taken up with the sources, manufacture, and uses of the many forms of the three important plant nutrients carried by fertilizers nitrogen, both organic and inorganic, phosphorus, and potassium.

Considerable space is devoted to a discussion of the constantly increasing importance of certain other elements, sometimes called "minor elements," in which some of our soils are now becoming deficient. Included in this category are sulphur, magnesium, iron, manganese, boron, copper, sodium, chlorine and salts carrying radium.

Closing chapters are devoted to the principles underlying the purchase, use, and methods of application of fertilizers.

F. C. HERSMAN,
State Institute of Applied Agriculture on Long Island.

Plant Physiology

EXPERIMENTS IN PLANT PHYSIOLOGY. Walter E. Loomis and Charles A. Shull. 213 pages, 51 figures, index. McGraw-Hill, New York and London. 1939. $2.

The book includes published directions for performing 167 experiments which are commonly used in courses in plant physiology. References in some instances to specific papers, questions at the end of each experiment, and an appendix on the preparation of various solutions add to the book's value. Although there is little which is new or unique in the experiments selected, the book should prove useful to teachers of courses in plant physiology.

W. J. ROBBINS.

Inducement for Traveling To Our National Parks

ROMANCE OF THE NATIONAL PARKS. Harlean James. Pages i-xiv, 1-240. Illustrated with 123 photographs; indexed Macmillan, New York, 1939. $3.

Several fine books have been published this year on our national parks, including the one here reviewed, which is appropriately dedicated to Dr. J. Horace McFarland, "who, as President of the American Civic Association, actively promoted public education in National Park possibilities and first proposed a National Park system; who for 30 years has joined in defending the National Parks against selfish aggression and who has never been found wanting when the National Parks needed a friend."

A fascinating account is presented of early exploration in the regions now preserved as parks and monuments and of the history and operation of the present National Parks system. Following this, the various parks and monuments are taken up in sequence: the magnificent mountains of the Northwest (Olympic, Rainier, Crater Lake, Cascades); pioneer western parks (Lassen, Yosemite, Sequoia, General Grant, Death Valley); the "magic Rockies" (Glacier, Yellowstone, Teton, Rocky Mountain); over the seas (McKinley, Hawaii), in the old Southwest (Grand Canyon, Zion, Bryce Canyon, Big Bend, Carlsbad, Mesa Verde, Arches, Natural Bridge, Rainbow Bridge, Hovenweep, Yucca House, Aztec ruins, Bandelier, Chaco Canyon, Navajo, White Sands, Petrified Forest, Canyon de Chelly, Montezuma Castle, Gila cliff dwellings); and east of the Mississippi, in the "mysterious Appalachians" (Shenandoah, Smokies); where land and water meet (Acadia, Isle Royale, Hatteras, Everglades); and the national historical parks and monuments (Colonial, Morristown, Chickamauga, Missionary Ridge, Lookout Mountain, Fredericksburg, Gettysburg, Shiloh, Vicksburg, Ft. Jefferson, Ft. Marion, Ft. Matanzas, etc.).

The pictures and descriptions are so real, so vivid, so entrancing, that the reader wants nothing more than to be allowed to drop whatever he is doing, pack up, and leave on a tour of the parks at once—and for an indefinite stay.

H. N. MOLDENKE.

Brief Notes on Varied Books

A Bookshelf for Gardeners

THE GARDENER'S LIBRARY. Edited by Edward I. Farrington for the Massachusetts Horticultural Society. Published by Hale, Cushman and Flint, Boston, 1939. $1 each.

A series of five inexpensive books recently issued by Hale, Cushman & Flint for the Massachusetts Horticultural Society covers a variety of topics of importance, especially for the novice in gardening.

THE GARDENER'S ALMANAC. Edward I. Farrington. 141 pages, illustrated, indexed.

The Gardener's Almanac, compiled by the society's secretary, tells briefly what to do with flowers, vegetables, fruits, lawns, trees and shrubs, how to get rid of pests, and what odd jobs need attention month by month.

THE VEGETABLE GARDEN. Edward I. Farrington. 139 pages, illustrated, indexed.

Mr. Farrington also writes on vegetables, giving at the end of the short volume some useful planting and cultural tables, with suggestions for vegetables for a family of five.

THE LAWN. Charles W. Parker. 118 pages, illustrated, indexed.

Charles W. Parker presents simple and practical rules for building a lawn in another book of the series. Drawings of lawn-making operations and uses of a lawn, obtained from the Chicago Park District, are an attractive and practical addition to the text.

HERBS. Helen Noyes Webster. 156 pages, illustrated. Bibliography.

Helen Noyes Webster has packed a vast amount of material into the pages of the book on herbs. This volume amounts to a second edition of a six-year-old bulletin issued by the Massachusetts Horticultural Society, and contains historical, botanical, cultural, culinary, legendary, and practical information, which is authenticated by the author's own research.

THE ROCK GARDEN. James H. Bissland and others. 128 pages, illustrated, indexed.

James H. Bissland has written a special volume on rock gardens for The Gardener's Library. The longest chapter, outside of the list of books pertaining to rock gardens, consists of an extensive selection of plants for use in rock gardens, prepared by F. Cleveland Morgan of Montreal. The book list was compiled by Elizabeth C. Hall of The New York Botanical Garden for the American Rock Garden Society.

Botanical Terms in German

GERMAN-ENGLISH BOTANICAL TERMINOLOGY. Helen Ashby, Eric Ashby, Dr. Harald Richter, and Dr. Johannes Bärner. 195 pages. English and German text and index. Nordemann, New York, 1938. $3.

One of the most useful of bilingual glossaries ever to reach the Botanical Garden's library is a book of German-English botanical terminology, prepared by two English and two German botanists. It includes terms used in plant physiology, ecology, genetics, and plant pathology, as well as general botany. Under each subject, simple descriptive paragraphs are given in the two languages on opposite pages, with all the technical words in both German and English conveniently set in italics.

Exploring in Persia

TO PERSIA FOR FLOWERS. Alice Fullerton. 195 pages, illustrated. Oxford University Press, New York, 1938. $3.

To the botanist and gardener, the last brief chapter of Mrs. Fullerton's Persian adventure is the best of all, for it is the only one in which the plants of the country are given more than a scant, passing mention. Most of the book is devoted to dusty travel from place to place and the author's experiences in healing the sick. She and her artist-companion, Nancy Lindsay, lived among the natives while in a little Persian village for about six months, so she writes intimately of their modes and manners of life Mrs. Fullerton's collections of plants went to the Britsh Museum.

The Year in New York

ALMANAC FOR NEW YORKERS - 1939. Federal Writers' Project. 153 pages, illustrated. Modern Age Books, New York, 1939. 50 cents.

Among all the guides and almanacs that have been published for this crowded year of 1939, the most amusing no doubt is the third Almanac for New Yorkers put out by members of the Federal Writers' Project. Among choice bits of history of the town and coming events, wedged somewhere between the addresses of all-night drug stores and the seasons for fish in New York, a page is devoted to the Botanical Garden's first specimen of *Amorphophallus titanum*, which bloomed in 1937—and which, incidentally, may be seen as a life-sized model blooming every 8 minutes this summer at the World's Fair.

CAROL H. WOODWARD.

THE NEW YORK BOTANICAL GARDEN

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PUBLICATIONS OF THE NEW YORK BOTANICAL GARDEN

Books

An Illustrated Flora of the Northern United States and Canada, by Nathaniel Lord Britton and Addison Brown. Three volumes, giving descriptions and illustrations of 4,666 species. Second edition, reprinted. $13.50.

Flora of the Prairies and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. Price, $5.50 postpaid.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. 1935. $1.65.

Flora of Bermuda, by Nathaniel Lord Britton and others. 585 pages with 494 text figures. 1918. $3.50.

A Text-book of General Lichenology, by Albert Schneider. 230 pages. 76 plates. 1897. $2.50.

Periodicals

Addisonia, annually, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants, eight plates in each number, thirty-two in each volume. Now in its twenty-first volume. Subscription price, $10 a volume (four years). Not offered in exchange. Free to members of the Garden.

Journal of The New York Botanical Garden, monthly, containing notes, news and non-technical articles. Subscription, $1 a year; single copies 10 cents. Free to members of the Garden. Now in its fortieth volume.

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North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. Planned to be completed in 34 volumes, each to consist of four or more parts; 87 parts now issued. Not offered in exchange. Prices of the separate parts on request.

Contributions from The New York Botanical Garden. A series of technical papers written by students or members of the staff, and reprinted from journals other than the above. Price, 25 cents each, $5 a volume. In the fourteenth volume.

Memoirs of The New York Botanical Garden. A collection of scientific papers. Volumes I-VII. Titles on request.

Direct all orders to The New York Botanical Garden, Bronx Park, New York, N. Y.

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DIRECTIONS FOR REACHING THE BOTANICAL GARDEN

The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station); from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge toward the Garden grounds.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

September, 1939

BEGONIA EMILY CLIBRAN	Cover Photograph by Fleda Griffith	
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AUTUMN DISPLAYS

From the time the first flowers appear on the hardy asters ("Michaelmas daisies") during the waning days of summer until, some weeks later, the last chrysanthemum is blackened by frost, the Botanical Garden's display collections near the main conservatories present a succession of colorful climaxes.

A brilliance and variety of bloom seldom surpassed at any other time of year mark the culmination of the season of outdoor flowers. The dahlias, which begin to open at the Garden after the middle of September, are the most vivid, with scarlet, yellow, and orange hues, as well as purple, pink, and white. As they overlap the seasons of both the asters and chrysanthemums, whoever visits the Garden while the dahlias are in bloom will find a magnificent pageant of fall flowers near the conservatories on the west side of the grounds. The annual border has been renovated for autumn and about 5,000 plants from summer sowings ha been added for late bloom In the court on the opposite side of the range, the tropical waterlilies will continue masking the pool with their flowers until they succumb to frost.

There are few other places in this country where there are amassed, for example, nearly 70 varieties of hardy asters; where well grown plants of 350 selected varieties of dahlias may be found; or where 3,500 plants of splendid chrysanthemums in 70 varieties are exhibited; and surely none where so many of these may be seen in one assemblage, each different kind plainly labeled.

Members and their friends who come to enjoy the autumn flowers or to take notes about them for reference in their own gardens will appreciate doubly the Botanical Garden's purpose in growing thousands of plants for display when they see the pleasure the flowers provide for the public and observe the attention given to them by experienced gardeners as they study and compare the many varieties.

NEW YO
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Tuberous Begonia Hybrids As a Gardening Hobby

By John Watts

DERIVED from species that are native in Bolivia and other Andean countries, the tuberous begonias of horticulture, in their numerous forms, are known by the group name of "*Begonia tuberhybrida.*"

The original species—*B. boliviensis, B. Pearcei, B. Veitchii,* and several others—are seldom seen except in botanical gardens, although they would be worthy plants for any discerning gardener to raise. Their countless hybrids, however, have acquired such diversified characters in form and color of flower that the culture of tuberous begonias is claiming the attention of many gardeners in search of colorful novelties. Especially if one has facilities for raising seedlings does the culture of tuberous begonia hybrids become a fascinating occupation, for one never knows what treasure will come forth with the opening of the first flower. Their colors range from white through yellow, salmon, pink, and red, and some of the double flowers give the effect of waxen roses. The single flowers are attractive too, and some have fringed petals. Another is the camellia-flowered type.

As these begonias are extremely easy to pollinate and are very free in bearing seed, the raising of hybrids makes an inexpensive hobby, also a gratifying one, for a large collection can be acquired within a short time.

Sowing the Seeds

The dust-like seeds of tuberous begonias should be sown during February or March in a temperature of about 65 degrees if one wishes to have good-sized tubers by the fall.

The compost, or mixture, to be used in sowing seed should contain 2 parts loam, 1½ parts humus or peatmoss, and ½ part sand. The sand keeps the mixture open, or porous, and also prevents the surface of the seed-bed from getting hard, a factor which is important to the young plants, as in their early stages they are delicate, small, and slow of growth.

If one is sowing only a small quantity of seed, I advise the use of small pots or half-pots known as pans; these are more easily handled than boxes or flats.

In preparing the receptacle for seed-sowing, the pot or pan is half-filled with crocks or cinders for drainage; over this some rough pieces of sod or partly decayed leaves are placed to prevent the fine soil from sifting through and clogging the drainage. The compost should be screened through a quarter-inch mesh sieve, and the pots or pans should be filled to within a half-inch of the top after gently pressing and leveling the soil with a small wooden presser or the base of a small pot. After this is done, a light dressing of the same mixture should be sifted over the top through a sieve made of window-screening. The whole should then be thoroughly watered and allowed to drain before seed is sown.

The seed should be evenly distributed and should not be scattered too thickly. It is so fine that it needs no covering with soil. The containers must go in a shady place, each of them covered with a piece of glass. This in turn is covered with paper to prevent the moisture from evaporating too quickly from the soil. The less one has to water seed during germination, the better.

Every day the paper and glass are removed, and the condensed moisture is wiped from the under side of the glass before replacing. As soon as germination commences the entire covering is taken off so that the tiny seedlings can have light and air. They must, however, remain in the shade. If at any time it becomes necessary to water the seed containers, they are best placed in a pan of water to within one inch of the top, where they may soak until the surface soil appears wet. During this stage they must never be watered from overhead, as this method only invites trouble by encouraging damping-off, a disease caused by a fungus which soon finishes a batch of begonia seedlings.

Handling the Seedlings

As soon as the first tiny pair of true leaves has appeared the seedlings should be given immediate attention, as a crowded condition will also cause the dreaded fungus to appear. Begonia seedlings must have plenty of room to develop, so it is important to transplant them at an early stage.

A mixture similar to the seedling mixture should be used, allowing for plenty of drainage as before but omitting the top layer of finely screened soil. The containers this time should be pans or shallow flats into which the soil is leveled and gently pressed as for seeding.

As the seedlings are too minute to be handled with the fingers, the pointed end of a wooden label may be employed for taking them out of the seed-bed, care being used not to disturb the tiniest ones, as these may perhaps turn out to be the best plants of all. The pointed end of a label will also serve to make a slight depression for the reception of each tiny plant. The seedlings are so very small that they can do little more than sit on the surface of the soil, hence if only gently pressed in they soon

take hold and start to grow. From now on, if conditions are suitable, they will make fairly fast growth, and will need careful attention as regards ventilation. Although they require plenty of air they will not, up to this stage, tolerate being in a draft.

By the time June arrives they are ready for a shift, either into pots kept inside in a cooler temperature, or planted in a shaded frame outdoors. I like planting begonia seedlings in a frame on the north side of a building or hedge, using a mixture containing a liberal amount of humus. The frame should have some sort of overhead protection, either a glass sash or a covering of cheesecloth to prevent damage from heavy rains and winds.

From now on, as the weather begins to get warm, one may expect to get an attack of begonia mite. When this happens the tips of the young growth turn black and become hard. As a preventive measure I dust the plants with flowers of sulphur. In fact, at this period it is a good practice to keep a light dust on all the time. I have had more success with this treatment than with any other insecticide or fungicide.

Seedlings planted in a frame for the first season develop larger tubers than those grown in pots. They should be allowed to grow as long as they will, that is, until the approach of really cold weather and killing frost. Then the tubers should be lifted carefully, dried off for a week or two, then placed in boxes, covered with dry peatmoss, and stored in a

fairly airy place with a temperature of about 50 degrees. It is important to cover the tubers before they start to get soft, after their preliminary drying, for they are otherwise liable to attack by dry-rot.

Growing Plants from Tubers

I have dwelt considerably on the culture of tuberous begonias from seed, as so much pleasure may be derived from this method. The seedlings give one a variety of forms and colors, and while some may not be worth keeping, the greater portion will be a joy to the gardener who raises them.

Begonias of this class may also be grown from tubers.

Whether ordering seeds or tubers, the gardener should specify which of the different types of flower he desires, or whether he wishes the upright or the hanging-basket type of plant.

Tubers can be obtained at any seed-store during the spring, and for early flowering they should be started early indoors. When the weather has become settled and the ground warm, they may be transplanted into the garden. As tuberous begonias do not like strong sunshine, they make ideal plants for shady places, where they produce a profusion of bloom until fall. In pots they are desirable plants for porches or north windows.

When I am cultivating tuberous begonias in pots, I first like to start them in flats in early spring indoors, at a temperature of 60 degrees. I simply put about two inches of peatmoss in a flat, lay the tubers on this, keep the medium moderately moist, and when growth of a couple of inches has been made, pot them off into pots two inches larger than the ball of roots and peatmoss that lifts out with the tuber. When the pots are filled with roots, I shift the plants to larger pots.

A good mixture for them consists of loam, humus, and sand, with the addition of a 4-inch pot of shredded cow manure, one of bonemeal, and one of Scotch soot to each bushel of compost. I am not a believer in too much fertilizer at first, but prefer feeding later as the plants require additional nourishment. One important thing in growing tuberous begonias in pots is *not to use too large a pot*. It is better to use a smaller size and keep feeding regularly. When the first flower bud shows is about the right time to start giving a little diluted cow-manure water, and repeat the feeding at least once a week.

If the begonias are to be grown outdoors, they may be planted out from pots as soon as danger of frost is past. Or, if dormant tubers can be kept in a cool dry place until June, with an even temperature of about 50 degrees, without making more than an inch or so of growth, they may be set directly outdoors without an intermediate stage in flats and pots.

It is not only the decorative forms and attractive colors of tuberous begonias that make them an incentive for gardeners to grow them, but also their adaptability, when given the proper care, to conditions of shade which few other showy plants will tolerate.

Begonia socotrana—

Its Progeny and Their Culture

By James G. Esson

WHEN *Begonia socotrana* is in bloom it is among the most colorful and free-flowering of all *Begonia* species.

It was on the island of Socotra in the Indian Ocean, far from the vegetative haunts of most of its family, that Professor Isaac Bailey Balfour found the first specimen of it in 1880. In the "Botany of Socotra" we find these words of his: "A plant of the higher regions of the Haghier Hills, under the shade of granitoid boulders."

Was it Balfour s flair for rock plants, so evident in later years, that inspired this description? Who would associate a begonia with boulders! Yet here it was, found in such a habitat; this species that was destined to be the forerunner of a race that every year fills thousands of square feet of greenhouse space and in winter gives cheer to thousands of homes.

B. socotrana has further distinctions. It is the only species that has been described as developing bulbs or bulbils. These are formed in a cluster and some writers have referred to them as buds or bud clusters, while others have described them as closely set scales or suppressed leaves. With such peculiarities it is not surprising that the season of growth of this species is also unique, commencing in September and flowering from late December until the end of February.

That this was a remarkable species was quickly noted. In the *Gardeners Chronicle* January 1, 1881, Hooker writes of it as having flowered in December at Kew. In *Hortus Veitchii* we are told that the stock passed into Veitch's hands and was distributed in 1882. As a flowering potted plant it was considered of much value.

Culture of the Species

As far as cultivation is concerned no begonia needs less care when its particular needs are understood and provided for. A minimum winter temperature of 55 degrees Fahrenheit will be necessary. Well drained loam and leaf-mold make a good potting soil mixture. Small clusters of bulbils should be planted near the surface of the soil no later than September 1. Until the bulbils become established and show signs of growth, they should be watered only when the soil is very dry. Afterward, however, they may be watered freely. They are best grown under light shade in a house where the atmosphere is humid.

After the flowering season the leaves begin to assume a yellow appearance and then the plants must be gradually dried and thus kept dormant until the growing season returns.

Propagation is best accomplished by division at planting time. New clusters should consist of not less than five or six bulbils.

The Hybrids of Begonia socotrana

X *Begonia hicmalis* (Fotsch)

I suspect it was the proclivity for winter blooming that impressed the gardener of the early eighties with *B. socotrana.* John Heal, a famous plantsman of the time, employed by the firm of Veitch, was the first hybridist into whose hands our species fell. In 1882 he used *B. incarnata* as the seed-bearing parent and crossed it with *B. socotrana.* The resulting hybrid was named ***Autumn Rose,*** but it does not seem to have existed for very long. Heal was familiar with the work of his contemporary John Seden, who had done so much with species from the Andes, creating many varieties of what we now know as *B. tuberhybrida.* With such a background it was natural for Heal to see the possibility of crossing *B. socotrana* with these summer-flowering hybrids, thus producing a winter-flowering race with the colors and size of flowers of the summer types.

According to *Hortus Veitchii* several hybridists commenced work about the same time and in 1883 a new kind of hybrid was evolved by Heal and named after himself. It was the product of *B. socotrana* crossed with the summer-flowering hybrid tuberous variety ***Viscountess Doneraile*** (vermilion red). This and two others that were named ***Adonis*** (a hybrid of the second generation) and ***Winter Gem*** were among the earlier of Heal's successes. All are said to have been carmine or rosy pink. He tells us through the medium of the *Gardeners' Chronicle* that he had less success with *B. socotrana* as a seed parent than he had when using the tuberous varieties as such. In a few short years he proved this from some of the fine varieties that Veitch placed on the market.

About 1912 the firm of Clibran in England brought to the public eye some varieties that were considered by many as a distinct improvement. They were described as "eye openers"; some were perfectly double and of different shades and with greater vigor. During late years new varieties have been placed on the market by the firm of Baardse, in Aalsmeer, Holland. I think that they in turn are an improvement in color and freedom of flower.

In 1933, Fotsch, in "Die Begonien," grouped all forms of this hybrid, describing them from a basis of the two varieties ***Ensign*** and ***Elatior.*** He gives the group the appropriate new name of *Begonia hicmalis.*

Since the introduction of the variety ***John Heal,*** *B. hicmalis* might be said to have had a rather checkered career. Although gardeners everywhere acknowledge its superiority as a potted plant when well grown, yet, for a number of reasons it has never reached any degree of universal popularity. In the past, young plants have been scarce commercially and consequently expensive. The bugaboo of a rest period, which often resulted in the loss of the choicest varieties, deterred many from proceeding further.

Propagation by means of leaf cuttings, which is so simple with the ***Gloire de Lorraine*** type, has led to failure with many varieties. The lack of knowledge of cultural needs, especially in the control of begonia mite has been a common reason for disappointment.

It would appear that in the last few years, nurserymen and gardeners have closely studied the cultural needs and have experimented more persistently, so that today *B. hiemalis* is grown with a larger degree of success.

Culture of Begonia hiemalis

During the first two weeks of November the main batch of cuttings should be dibbled into sand. While it is true that some varieties will respond to the leaf-cutting method, I would recommend eliminating such practice when propagating this type. Many leaf cuttings that may make roots are too slow in forming bud growth and many make weak growth. Leaf-bud cuttings—which consist of the lamina and petiole with the axil bud and part of the stem attached—may be a good vegetative method of propagation. I have not had sufficient observation of this to recommend or condemn it.

Stem cuttings, made by using terminal growth 2 to 3 inches long, seem to give the best results. It may be necessary to sacrifice a few good plants of each variety for propagation. That will depend on the quantity needed. As a general rule a sufficient number of cuttings can be obtained without seriously damaging good flowering material.

Cuttings must appear healthy and free from disease or insect pests. They will root readily in sand on a bench, in flats or in other containers, in a temperature dropping to 60 or 62 degrees at night. When rooted, they may be potted in 2½-inch pots, keeping the base of the stem as near to the surface as possible, and using a soil mixture that is three-quarters peat and one-quarter sand The pots may be plunged rather closely in peat on the bench and shaded from bright sunshine.

By March the little plants will show signs of growth and new shoots should appear at the base from a small tuber that will have formed. If the roots, upon examination, appear plentiful, the plants may be repotted into a 4-inch size, using one-third loam, one-third peat or leafmold and one-third sand. To every bushel of this medium, a 7-inch pot of finely screened dry cow manure and a 5-inch potful of superphosphate 20 per cent should be added. After the plants have reached the 4-inch size it is not necessary to plunge, but simply to stand them on the bench, keeping each variety grouped together. By May, it will be possible to pinch out the top growth. This will encourage the formation of a branching plant. These top growths may be used at this time as cuttings that will make small flowering plants for the fall.

Repotting must be done from time to time up to the end of August as appears necessary to the grower. The final shift will be into an 8-inch size pot for the best specimens of November plants. For the last potting a soil that has incorporated in it a large quantity of humus in the shape of leafmold or peat seems to be best. I believe in placing enough drainage material in the bottom of the pot to assure a free passage of water. When potting, the soil should not be packed firmly. It is better to pound the pot on the bench hard enough to settle the soil around the roots. Pinching or stopping of terminal growth may be done as required, with the aim of obtaining a plant with from six to ten leading shoots. With the exception of some red varieties that have a tendency to flower early, pinching should be discontinued after August 15. Varieties that run to flower early, however, may be pinched for a month longer.

It is necessary to shade the plants throughout the growing season. Red-flowered varieties seem to require a heavier shading than do any of the others. It is a mistake however to shade too heavily. Although the broad peltate structure of the leaves

Specimens of Begonia hiemalis in one of the greenhouses on the estate of Mrs. Roswell Eldridge at Great Neck, where Mr. Esson is superintendent. The leaves in the foreground are those of Begonia Rex.

denotes plants that prefer to grow in shade, we must yet remember that Balfour says that *B. socotrana* was shaded only by rocks, and we may presume that a fairly strong light was available. Darkness with humidity usually means dankness, no matter how carefully the pots have been drained, and the result may be an unhealthy condition of the soil. Shades that can be lowered or raised as occasion demands are ideal, yet it is possible to get excellent results by shading the roof glass with white lead mixed with gasoline to the consistency of thin paint. When the latter plan is followed it is advisable to leave a narrow band of clear glass down the center of each row of panes. This can best be accomplished by placing a plaster lath on the glass while the shade is being applied. Strips will thus be left where sufficient light may enter the house at all times.

Paths, walls, and every bare surface in the house should be moistened several times daily, depending entirely upon the drying conditions of each day. Overhead spraying should not be used. From June to September liberal ventilation is required, but draughts must always be rigorously avoided. During the summer, top ventilators must be left open at night, but when colder nights arrive, it will be necessary to close the house to maintain a temperature of 55 degrees. When flowering season comes the temperature may drop to 50.

As growth demands it, stakes must be used, and it is a work of floral art to stake a begonia well. These stakes may be of galvanized wire, split bamboos, or thin wood. They should on no consideration be seen when the plant has completed its growth.

Feeding with weak liquid farmyard manure or with one of the many recognized complete greenhouse fertilizers will give excellent results if applied after the roots have penetrated the soil in the final potting. Nitraphoska, if no stronger dilution than 1 ounce to 1½ gallons of water is used, has much to recommend it.

Nothing is more important in begonia culture than the control of disease and insects. Diseases such as gray mold rarely occur unless cultural conditions are very bad. Insect pests are more troublesome. Many gardeners have had disappointments with these plants by failing to control thrips, mite and nematodes. Signs of mite or thrips are crinkled leaves and a general unhealthy condition of the plant. They are easily controlled by using every ten days during April, May and June, Cyanogas fumigant specially prepared for greenhouse use. On a calm evening it may be sprinkled on the path and the house closed for the night. It is important to apply no more than is recommended by the maker, and also to have the foliage thoroughly dry; otherwise much damage may result. Humidity in July and August makes the use of Cyanogas a dangerous practice—at least this is true on Long Island. At this time Nicofume tobacco powder may be used to control thrips.

Nematodes sometimes feed on begonia roots, causing the plants to wilt and die. Sterilization of the soil may be necessary. Sometimes control can be effected by soaking the roots in a soil disinfectant as soon as symptoms of their presence are observed.

If it is desired to carry over plants for a second or third year, it will be essential for their resting period that a house be provided where the temperature can be maintained at 50 degrees at night and where it will not be necessary to water often. A growing condition must be avoided, but at the same time the roots must not be allowed to become dry. The rest period should continue, with part of the old stems persisting, until some time late in March, when the old soil may be shaken out and a fresh start in a smaller pot can be made. Growth will soon commence and cuttings of scarce varieties may be secured. These older plants may be grown into specimens 3½ feet and more across at flowering time.

Selected Varieties

Some varieties that have been recorded are now, if not out of cultivation, difficult to procure. A selection, all grown commercially today, would include the following sorts:

Emily Clibran—double, rose-pink, free flowering; vigorous grower.
The Pearl—similar to ***Emily Clibran*** in every way, but flowers creamy white.
Mrs. John Heal—large single rose-purple flowers.
Lucy Clibran—large single orange-red flowers.
Altringham Pink—bright pink double camellia-like flowers.
C. J. Augustein—improved form of preceding variety; bronze-green foliage.
Emita—vigorous; very large coppery-orange flowers.
Flambeau—vigorous; flowers double, orange-scarlet.
Pink Perfection—double; a good pink, free flowering.
Orange King—fine variety; large orange-pink flowers, single.
Exquisite—similar habit to preceding, but flowers rose-pink.
Fascination—orange-salmon single flowers.
Optima—vigorous grower and popular variety; flowers orange pink, single, freely borne.
Baardse's Orange—similar to preceding, but flowers larger.
J. F. Ch. Dix—similar to last two, flowers more brightly colored.
Boko—the finest of the ***Optima*** group.

Schweden –habit of growth similar to ***Optima***; flowers single, purple-rose, freely borne.

Oranjezon perhaps the choicest of all, glowing orange color, might be described as golden.

John C. Mensing—dwarf and compact grower, orange. Perhaps the most useful in the orange group.

Elatior—rosy-carmine, semi-double flowers; one of the best older varieties.

Mevrouw Baardse—similar to ***Elatior.***

Snowdrop white; camellia-flowered.

Fred Muntz—improved form of ***Snowdrop.***

Baardse's Wonder—finest of all red varieties; free-flowering, single, deep red, with effective black staminodes.

X *Gloire de Lorraine* Series.

The ***Gloire de Lorraine*** race of hybrids was first obtained by Lemoine of Nancy, France, when in 1891 he crossed *B. socotrana* with *B. Dregei* and named the resulting hybrid ***Gloire de Lorraine.*** This was the original cross of the series now commonly known as Christmas begonias.

Gloire de Lorraine became exceedingly popular in European gardens. It was extremely floriferous and its gay color during winter naturally was a strong asset in its favor. The culture is comparatively simple, although earlier in this century success with it was actually considered as a measure of a gardener's ability as a grower. Ever since its introduction ***Gloire de Lorraine***, its sports, and other derivatives have been grown in large quantity by commercial growers. In most cases the flowers have resembled the parent *B. socotrana* with the exception of an occasional white sport, proving no doubt, that the white flowers of *B. Dregei* could be segregated. Rarely are they as large in any variety as in *B. socotrana.*

New varieties or sports were introduced from time to time but it is doubtful if any appreciable improvement on the original ***Gloire de Lorraine*** was found until the series came to the notice of J. A. Peterson of Westwood, Cincinnati. He, it seems, was anxious to improve upon the lasting qualities of the flowers when the plant was brought into the home. Until 1910 a variety known as ***Lonsdale Pink*** was largely grown in the United States because up to that date it proved itself to be less easily affected by the dry hot air of the living-room. This was crossed back on *B. socotrana* by Peterson and at that time he obtained ***Glory of Cincinnati***, which florists claimed held its flowers better than any of its predecessors. Moreover the flowers were larger. Improved varieties have since been introduced from time to time. The variety ***Melior***, raised in 1914, has had an enormous share of popularity.

The most highly esteemed varieties of the present day are ***Lady Mac***, which has very pleasing pink flowers, and ***Marjorie Gibbs***, with a larger flower than the former but not quite such a pleasant shade of pink. A new

variety, ***Lucille***, is on the market this year. The flowers are bright red and as prodigal in their numbers as in any of the other varieties. My information is that this originated from a young growth on a discarded plant of a Christmas begonia that was left below the bench of a greenhouse somewhere in New England.

Culture of Gloire de Lorraine

For many years after its introduction this series was propagated in April from cuttings. After flowering, a few plants were partly cut down and retained as stock plants. Sufficient young shoots for cuttings appeared on these in spring. The resultant plants were of a rather thin and straggly nature compared to those seen today. Although excellent specimens were grown, yet they were not easily induced to make bushy, branching plants.

It is probably about thirty years since growers first adopted the present method of propagation from leaf cuttings; that is, from leaves that are healthy and that have sturdy petioles. The propagating bed should consist of clean sharp sand that has been packed down moderately firm. Perfect drainage should be provided. The temperature of the sand where the roots are to form should be maintained by bottom heat at 70-75 degrees. The overhead temperature may drop to 60 at night, rising by day with the heat of the sun. I have not found it necessary to use hormones in the vegetative propagation of begonias. About November 1 the leaves are removed from the parent plant and the petioles inserted about 2 or 3 inches deep in the sand, set so that the lamina is standing at an angle of 45 degrees to the row which is being made. They should be spaced sufficiently distant so that light may reach every one, with enough room left between the rows to sprinkle with tepid water by means of a watering can. Overhead watering is to be avoided except at the time the cuttings are set in the sand. During the period of root formation, water should be applied only when it is obviously needed. It is not necessary to use a closed case as this will cause condensation which may be the beginning of much trouble. Draughts such as might occur by direct line of contact with ventilators must be avoided, and a rather moist atmosphere should be maintained in the house or compartment so that evaporation from these leaves will be reduced to a minimum.

In a month enough roots should be formed at the base of the petiole to warrant the first potting into a 2½-inch size in a mixture of leafmold and sand The pots may be plunged in peat as is recommended for *B. hiemalis*. This will assist in providing a more even temperature for the plantlets in the formation of new growth from the callus at the base of the petiole. About a month later young shoots should begin to appear, and the plants may be potted on when necessary, never allowing them to become potbound until they have reached the final and flowering pot, which may be a 10-inch pan if the plants have been well grown. Similar potting soil and growing conditions as are required for *B. hiemalis* suit the ***Gloire de Lorraine*** group.

This series may be planted from 4 or 6-inch size pots into hanging baskets in which they grow to be very attractive specimens. Cuttings rooted in July make useful little plants to flower in 4-inch pots for Christmas table or room decoration.

Gloire de Sceaux

The aforementioned hybrids have so far carried the banner for *B. socotrana*. In fact, no others have ever received any real share of popularity. Worthy of mention however, is ***Gloire de Sceaux***, which is *B. subpeltata* crossed with *B. socotrana*, and obtained in 1884 by Thibaut and Keteleer.

The culture is similar to that of *B. hiemalis*. Very handsome specimens may be obtained if the plants are grown on for a second year.

Chinese Ginger

By W. M. Porterfield

(No. 7 of a series on Chinese Vegetable Foods in New York)

CANDIED ginger, powdered ginger, ginger ale, and ginger preserved in stone jars are the forms in which *Zingiber officinale* is known to the American public. We like it as a confection, for seasoning, and in a drink.

The great bulk of the ginger rhizomes that are candied and preserved are imported from China, though the plant is also grown in the West Indies, where it was introduced so early that exportation to Europe began in the sixteenth century. The preference for ginger from China lies in the fact that it is more succulent than the West Indian variety. The conditions of cultivation are held responsible since the same species when grown in mountainous districts remains a much smaller plant than when grown in lowlands such as the rich alluvial lands of the Canton delta. Canton and Hong Kong are the chief exporters of preserved ginger.

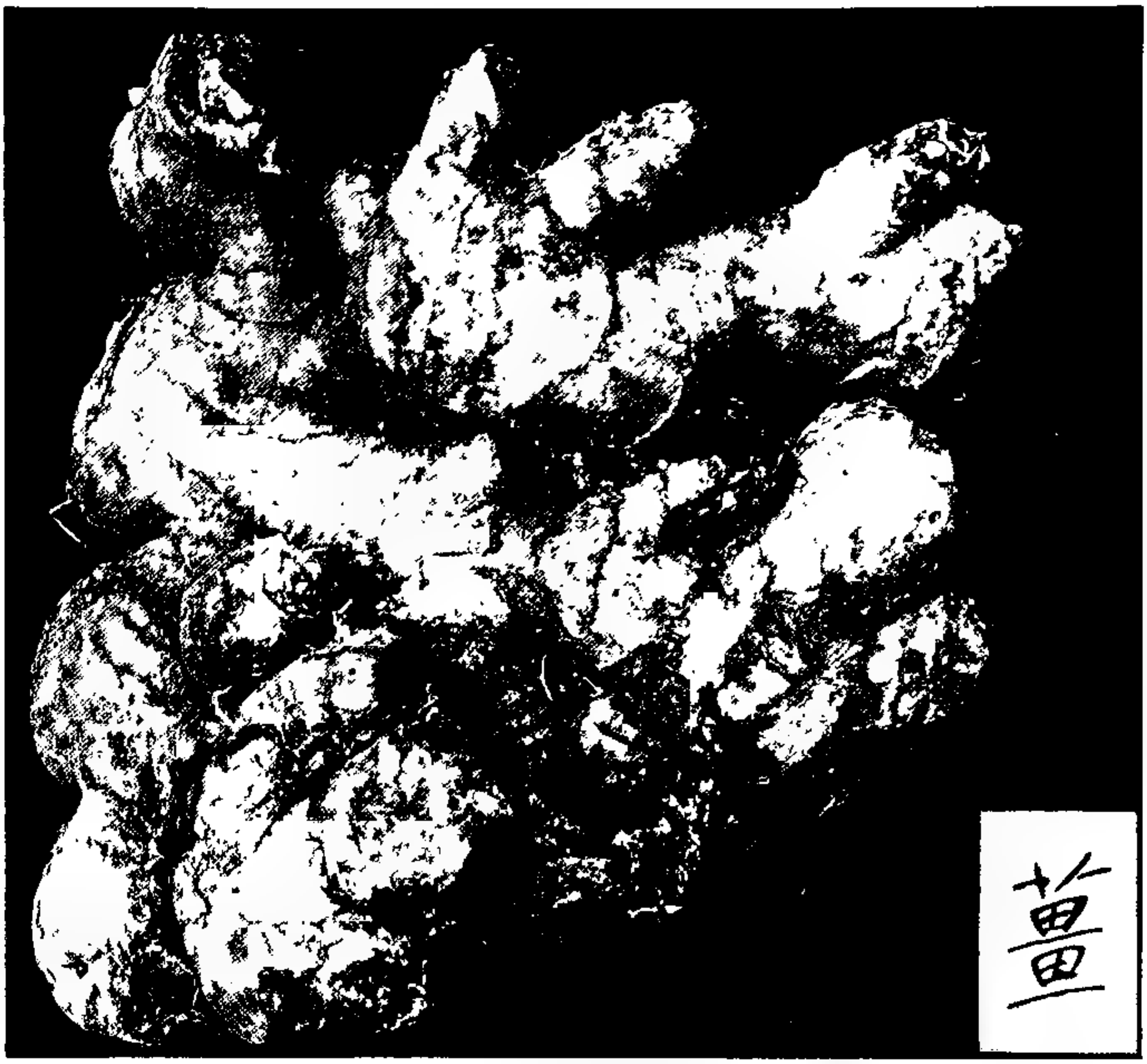
The native home of ginger is not positively known, as it no longer occurs in the wild, but the plant is suspected of being Asiatic in origin. It is cultivated in China as far north as Shantung[1] and in the West Indies it can be cultivated up to an altitude of 3,500 feet. As far back as 1884 Great Britain imported more than five million pounds. In the United States importations of the raw root alone as early as 1905 amounted to 6,900,000 pounds.

The fleshy finger-like rhizomes are the part of the plant used. The leaves when crushed are highly aromatic and even under normal conditions give off an odor, a feature which makes them often desirable to horticulturists. The plant grows to about 2 or 3 feet in height and when it flowers produces a dense cone-like inflorescence. The Chinese say that this plant never flowers, and Hance reported the same, but Mr. Charles Ford,[2] the director of the botanical gardens at Hong Kong, China, assures us that he has seen it flower. An illustration of the plant as a whole can be seen in Volume 26 of *The Garden*, page 284.

Beginning in 1878 a long controversy took place as to the identity of Chinese ginger. Mr. G. M. H. Playfair, British Consul at Swatow, China, sent a specimen of rhizome to Kew to be identified. Flowers were not available so a great deal of correspondence ensued. It was thought at first to be what was then called *Alpinia Galanga* Willd. (now recognized as *Languas Galanga* (L.) Merrill), but it was not settled until Mr. Ford,[2] while identifying the specimen sent by Mr. Playfair as "*Alpinia*", definitely proved that Chinese ginger as such is *Zingiber officinale* Roscoe. It was

[1] F. N. Meyer. Plant Immigrants. U.S.D.A., Bureau of Plant Industry. No. 110: 897.

[2] Kew Bulletin **28**: 16. 1892.



Chinese ginger root, with the character for "chiang," its Chinese name.

found that a ginger for local use in cooking and for medicine is cultivated in the mountainous districts near Swatow. This is a *Languas* and Mr. Ford explains that since Swatow is only 200 miles from Canton and since the same general name for ginger is used for both (although the one is known to us as galingale), it is most probable that the farmers who brought the specimens unwittingly deceived Mr. Playfair, who thought he was getting the true Chinese ginger. Not only were flowers eventually obtained and the general habits of the two plants compared, but characteristic differences were found in the starch grains in the two kinds of rhizomes.

Fresh ginger, according to Stuart,[3] stimulates the digestive organs, quiets nausea, checks coughs, and acts as a carminative and astringent remedy in dysentery. It also is considered an antidote for mushroom poisoning.

[3] Stuart, G. A. Chinese Materia Medica, p. 465. 1928.

The ginger skin is used to clear opacity of the cornea, and the juice from the leaves is drunk as a digestive stimulant and as a local application in ecchymosis. Oil of ginger is made in Kuantang and used as a condiment. Li Shi-Chen described ginger very well in the Pen-tsao, ancient Chinese medical book, but chose to separate the accounts of dry and fresh ginger root. In the appendix of the Pen-tsao are listed the essences and among these is the essence of ginger (CHIANG-LU) which is made by a process of distillation. It is considered to be antiseptic, antimalarial, and expectorant. In addition there is a tincture of ginger (CHIANG CHIU) which is nothing more than ginger root steeped in alcohol or ginger juice fermented with yeast. This is used as a stimulant in colds and indigestion.

Candied ginger as it is sold in New York's Chinese shops.

The Chinese name for ginger is CHIANG, fresh ginger being termed SHENG CHIANG; *Languas* is called LEUNG KEUNG (Swatow dialect for LIANG CHIANG); *Zingiber* is TAI-YEUK KEUNG; and *Curcuma* (turmeric), also of the ginger family, is WONG KEUNG. The name *Zingiber* comes from the Greek name ZINGIBERIS, the term which Dioscorides gave to a spice-bearing herb used by the Arabs. In the Sanskrit the name means "antler-shaped," referring of course to the branching rhizomes.

Marco Polo[4] found both ginger and galingale in great quantities in Fukien province as did also Robert Fortune at a later date. It is said that Szechuan and southern Shensi were famed for their ginger in ancient times, and the product is still exported from Hankow. Around Ning-yuan

[4] Bretschneider, E. History of European Botanical Discoveries in China, pp. 2, 8, 508, 709. 1898.

in Szechuan and also in the hills back of Soochow in Kiangsu province, ginger is plentiful. By word of explanation, galingale, the lesser or Chinese galanga of commerce, is *L. officinarum* (Hance) Farw. Garcia ab Orta,[4] first physician to the Portuguese viceroy of India at Goa, in his publication on medicines and drugs in 1563 differentiated between the galanga minor of China and the galanga major of Java, the latter of which is the source of the drug known as rad.

Dr. Abel,[4] who was the doctor and naturalist on Lord Amherst's staff during his famous expedition to the imperial court of China in 1816-17 told of the useful plants grown at different places. At Nanking he came across much ginger in cultivation. Fortune[5] found it on the mainland near Amoy, also in Japan. Wilson[6] noted the fact that ginger was extensively grown in central China and prepared for table use, and that preserved in sugar it is exported in quantity (see photograph). Finally, Meyer[1] on his collecting expedition to China investigated ginger and photographed a field of it in Shantung province suggesting that because it will stand low temperatures with or without irrigation it is suitable in the south of the United States for dooryard garden cultivation.

In view of the size of the ginger-ale industry, plantations of ginger in the south of our country should be both profitable and of great aid in boosting our national production. Ginger root as a crop is not grown anywhere in the United States in spite of the ease with which it can be cultivated. Propagation is entirely by division of the rhizomees. Roxburgh wrote that he never saw the seed and we do not have any descriptions of the seed. It flowers but what the nature of the sterility is that is operating to prevent seed production is still a mystery.

Housewives who essay to preserve their own ginger are warned to cover their hands while working with it because of the burning properties of the volatile substances emanating from the raw rhizome. According to analyses recorded by Read and Liu,[7] the tuber contains fatty oil, 3.7%; essential oil, 1.35%; gingerol and resin. As a means of detecting exhausted (a type of adulterated) ginger, agricultural chemists in 1901 suggested the process of Winton, Ogden, and Mitchell for determining cold water extract.[8] Four grams of ginger are placed in a graduated 200 cc. flask, filled with water, which is then shaken at half hour intervals for 8 hours and allowed to stand for a further 16 hours. By filtering and evaporating 50 cc. a residue is obtained which when dried to a constant weight at 100° Centigrade represents a complete extraction.

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[5] Fortune, Robert. Wanderings in China. pp. 29, 381, 384. 1847; also Yedo and Peking. p. 58. 1863.

[6] Wilson, E. H. A naturalist in western China. **II**: 59. 1913.

[7] Read, B. E. and Liu, J. E. Plantae Medicinalis Sinensis. Flora Sinensis, A. **I**: No. 594. 1927.

[8] Wiley, H. W., editor 1902. Provisional Methods for the Analysis of Foods. U.S.D.A. Bureau of Chemistry, Bull. 65: 59.

Evening Courses For Gardeners

THE fall term of the Botanical Garden's evening course in practical gardening, which is designed for both professional and amateur gardeners, will open September 28 and will continue for twelve consecutive Thursday evenings, except for Thanksgiving day.

"Fundamentals of Gardening" is the subject for the term. T. H. Everett will be the lecturer. Registration may be made in advance or between 7 and 7:40 p.m. on the opening night. The lesson will begin each week at 7:45 and will be given in the lecture hall of the Museum Building. After the winter holiday season the course will continue with "Outdoor Gardening" taught by P. J. McKenna. Those who complete the winter term satisfactorily will be eligible for enrolment in the laboratory course in the spring, at which the principles learned during the winter term will be put into practice outdoors.

Upon the satisfactory completion of two years of study, members of the course will be awarded certificates by the Botanical Garden. A circular giving a complete description of the course will be mailed to those who request it. The course is limited to 60 students.

The Science Course for Professional Gardeners, organized for the student gardeners at The New York Botanical Garden but open to a limited number of professional gardeners from outside, is beginning its seventh year this fall. Application for enrolment in this course may also be made in advance or in the Museum Building at the Botanical Garden the opening night, Oct. 2, at 7 p.m.

Subjects to be taught this term are "Systematic Botany—A" by Dr. H. N. Moldenke and "Plant Morphology" by Dr. H. W. Rickett. The complete outline of this course, as published in this Journal last September, will be sent upon request by mail or telephone.

Lectures For the Autumn Months

THE free lectures on Saturday afternoons at The New York Botanical Garden during the first three months of autumn include three addresses by representatives of the British Government at the New York World's Fair. Dr. Maurice Ashby of the Imperial Institute, London, opened the series September 9 with a talk on tea, coffee, and cocoa as they are produced in various parts of the British Empire. He is speaking again Sept. 30 on "Spices from the Colonies." On Oct. 21 Mr. A. G. Findlay, who has been recently retired from the Colonial Agricultural

Service, will speak on "Rubber Production in Malaya." The entire schedule, which includes nature study, gardening, travel, and exploration, as well as talks on plants which are useful or harmful to man, is given below.

Sept. 9—BEVERAGE PLANTS FROM BRITAIN'S EMPIRE
MAURICE ASHBY, Imperial Institute, London

Sept. 16—MUSHROOMS TO HUNT IN THE FALL
WILLIAM S. THOMAS, Author of Mushroom Book

Sept. 23—ROCK GARDEN CONSTRUCTION
A. C. PFANDER, Assistant Superintendent

Sept. 30—SPICES FROM THE COLONIES
MAURICE ASHBY, Imperial Institute, London

Oct. 7—BULBS FOR NATURALIZING
ETHEL ANSON S. PECKHAM, Honorary Curator

Oct. 14—SHRUBS FOR AUTUMN EFFECTS
JAMES G. ESSON, Supt. Eldridge Estate

Oct. 21—RUBBER PRODUCTION IN MALAYA
A. G. FINDLAY, Late of Colonial Agricultural Service

Oct. 28—FUNGI AND HUMAN BEINGS
J. GARDNER HOPKINS, M.D., Columbia University

Nov. 4—SUCCESS WITH AZALEA AND RHODODENDRON
P. M. KOSTER, Bagatelle Nursery

Nov. 11—A TRIP THROUGH THE CONSERVATORIES
T. H. EVERETT, Horticulturist

Nov. 18—PLANT HUNTING IN SOUTHERN MEXICO
W. H. CAMP, Assistant Curator

Nov. 25—DYE PLANTS OF THE AMERICAN INDIANS
G. L. WITTROCK, Docent

Dec. 2—CULTURE AND AGRICULTURE OF THE MAYAS
VICTOR W. VON HAGEN, Explorer and Lecturer

Dec. 9—SPRINGTIME IN CRETE
PROF. CLARENCE H. YOUNG, Columbia University, and MRS. YOUNG

Rare Myxomycetes Collected

Returning from the annual Mycological Foray, which took place this year in the Great Smoky Mountains Aug. 17-20, Mr. Robert Hagelstein reports that he collected 80 species of myxomycetes, including several rare forms. He obtained a new record for eastern North America with specimens of *Prototrichia metallica*, formerly known in North America only from the Rockies and the Pacific Coast. It is common in Europe.

Among the species seldom found, but brought back from the Smokies by Mr. Hagelstein, are *Calonema aureum*, *Physarum Listeri*, *Cribraria splendens*, *Diderma rugosum*, and *Didymium crustaceum*.

All will be added to The New York Botanical Garden's already large collection of the mycetozoa, or myxomycetes.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Food Plants From Forest and Field

EDIBLE WILD PLANTS. Oliver Perry Medsger. 323 pages, illustrated, indexed. Macmillan, New York, 1939. $3.50.

When a book such as this is published, there is the sudden wonder why it has not been done before. A knowledge of the possibilities of surviving if one were lost in the wilderness would lift from many nature-lovers a certain real, if unacknowledged fear. Having tried many kinds of wild fodder when plant-hunting with a botanically-minded father and having acquired later a knowledge of mushroom opportunities, this writer has not had that fear. But it exists, and often, when the sun gets low and the homeward trail is not too well marked, the experience clouds for many people what would otherwise be full enjoyment.

Wild food such as is described here would not as a rule induce any but the most confirmed nature-idolators to forsake the abundant offerings of the local butcher and grocer, but when one can add to such home nourishment a handful of wintergreen or partridge berries, black birch twigs or sassafras leaves, dewberries, raspberries, huckleberries or wild strawberries, there is a joy in finding them which adds a zest to the beauty of mountainside or valley or woodland.

I have to admit that many of the plants which are named I should never want to eat. I should have to be pretty near starvation before trying skunk cabbage or stinging nettle. Though I know that narrow-leaved dock and purslane (pusley), common milkweed and pokeweed (the young stems, not the poisonous roots) are edible, I have never been tempted by them. There are many attractive and useful ones, however: the wild bean (*Apios tuberosa*), the Jerusalem artichoke (*Helianthus tuberosus*), the Maypop or passion-flower (*Passiflora incarnata*), and many, many nuts and berries, mints, and other wild herbs. The list is long. This book will induce many to try them.

I shiver at the thought of anyone's eating a Calochortus, the exquisite mariposa lily (*C. Nuttallii*). It would be as much of a sacrilege as to eat a trailing arbutus or a fringed gentian. Only absolute starvation would excuse it. I also hope nobody would eat a star of Bethlehem. Luckily, no edible orchids, if such exist, are on the author's list.

Mr. Medsger gives only a page and a half to mushrooms, though the frontispiece shows the delicious morel (*Morchella esculenta* var. *conica*), one of the best of the fungi, when stuffed and baked. Even in so short an account, sharper warning should be given of the dangers of indiscriminate mushroom gathering, especially when enthusiasm might be leading adventurous souls to try many new foods. The old foolish legend is firmly fixed in many minds concerning the silver spoon that does not discolor, the pleasant taste, etc., when the fact is that the deadly Amanita, attractive to look at, pleasant—so it is said—to the taste, answers every popular test, yet will cause practically certain and agonizing death. Mushrooms should be avoided, unless one studies them carefully and learns which are the poisonous ones.

Other cautions should be given. Sweet-flag or calamus-root, for instance, much beloved by the small boy, should be consumed with discretion, for exceedingly painful though probably not dangerous results follow an overdose.

All in all, in the desire to include as many plants as possible, which is a natural and laudable wish, I feel that the author has rather overdone the matter and that it would be well for the amateur experimenter to proceed with caution. Yet the book is valuable and interesting in indicating to many people the vast amount of possible food we may find in our fields and forests and the pleasure to be gained by knowing these useful plants.

SARAH V. COOMBS.

A Manual on Vegetables

THE VEGETABLE GROWING BUSINESS. R. L. Watts & Gilbert S. Watts. 549 pages, illustrated; index and appendices. Orange-Judd, New York, 1939. $3.50.

It is seldom possible for a vegetable grower to find in book form the valuable experiences of a successful commercial vegetable grower. It is also a rare occasion when a college man and a farmer join forces to write a book. The Vegetable Growing Business is such a book.

The senior author is R. L. Watts, Dean Emeritus of the School of Agriculture at Pennsylvania State, and the junior author, Gilbert Watts, is owner and manager of a 250-acre vegetable farm, growing some 20-odd different vegetables. The farm is located at Bellwood, Penn.

The book is presented by the publishers as an up-to-date volume to supersede Vegetable Gardening, which has been used as a standard text and reference on vegetable growing for some 25 years. As the name of the new book implies, the presentation of the subject matter stresses the business end of vegetable production much more than in any text to date.

Some readers may feel inclined to criticize the absence of a list of references at the end of each chapter, and some may object to the fact that no reference is made to specific pieces of work or experimentation. In spite of these facts, the book is founded on a thorough search and understanding of the available literature and a sound knowledge of commercial practices. It is a book that one can sit down and read straight through, a thing that many growers should do, even though they may never be engaged in all the things they read about.

The first twelve chapters, covering about 200 pages, follow in general the problems that are usually taken up in other texts, such as Locations and Soils, Seeds, Plant Growing, Fertility Program, Planting, Cultivation and Weed Control, Irrigation, Insects and Diseases, Harvesting, Packing and Marketing, and Storage. One notable addition is a chapter on Management and emphasis is placed on the fact that every good farmer must be a good business man and a good executive. The rest of the text is devoted to the various crop groups, and the last chapter covers briefly the principles of vegetable forcing as carried on in the United States.

In the last 25 years many new varieties of vegetables have appeared; new methods of disease and insect control have been worked out; new fertilizers and new methods of applying them have been discovered; new types of irrigation are proving themselves practical; and changes have been made in methods of packing and shipping. All these new problems and practices are covered in the book, and the appendix has a wealth of material that should prove valuable to the home gardener as well as the commercial grower.

W. V. CUTLER,
State Institute of Applied Agriculture on Long Island.

England's Native Plants

WILD FLOWERS IN BRITAIN. Robert Gathorne-Hardy. 120 pages, illustrated, indexed. Scribner, New York, 1938. $3.50.

Many books have been written on the English flora but there is adequate room for this book by Gathorne-Hardy in that the author, instead of attempting to give a technical description of each plant, sets forth in a charming literary style the pleasures that are to be had from the search for the native plants of Britain. His enthusiasm throughout should bring joy to many readers, even to those who are not keen observers of plant life.

Sections of the book are devoted to flora of the woodlands, meadows, moorlands, and other areas; also a most interesting account of the native orchids is to be found.

The book is well illustrated with some 100 first-class photographs of plants taken in their native habitat, and it would have been better to confine the illustrations to these instead of including the color drawings, which give the impression of artificial flowers.

PHILIP CHANDLER.

Anatomy of Food Plants

THE STRUCTURE OF ECONOMIC PLANTS. Herman E. Hayward. 674 pages, illustrations, glossary, index. Macmillan, New York, 1938. $4.90.

The Structure of Economic Plants by Herman E. Hayward surveys and summarizes present knowledge of plant anatomy. The book has been divided into two parts, the first consisting of a thorough

review of anatomical structure, discussing cells, roots, shoots, flowers, and fruits. The second part presents a complete anatomical analysis of thirteen families, using as illustrations fifteen common economic plants: corn, wheat, onion, beet, radish, alfalfa, pea, flax, cotton, celery, sweet potato, white potato, tomato, squash, and lettuce.

The book is scarcely suitable as an elementary text for class work, but certainly can be recommended as a reference for critical interpretations of anatomical structure as applied to the above examples of economic plants.

G. L. WITTROCK.

Ecology in Forestry

FOUNDATIONS OF SILVICULTURE UPON AN ECOLOGICAL BASIS. Second edition. The late James W. Toumey and Clarence F. Korstian. 456 pages, 22 figures, index. John Wiley & Sons, New York and London. 1937. $4.50.

Professor Korstian's close association with the development of professional forestry, with teaching and with research during the decade which passed between the two editions of this important text and reference book has enabled him to improve the valuable original. This improvement results not only from the inclusion of research results during the interim but in a reorganization of the materials of the book which provides a more logical and better emphasized treatment.

The substitution of a bibliography at the end of the book proves to be more satisfactory than the original footnote citations. The inclusion of a list of forest species by both their technical and standardized common names is likewise to be commended.

Between silviculture and ecology, both academic and applied, it is impossible to draw a line, even if it were desirable to do so. Much of the ecology had its origin in the work of foresters, and today, in America, much of the best ecology is being produced by the practising foresters. It is good that this is so, and it is good that there is a text in "forest ecology" which is of such importance both to academic men and to those with field boots on.

STANLEY A. CAIN,
University of Tennessee.

For Herb Lovers

HERBAL DELIGHTS. Mrs. C. F. Leyel. 429 pages, illustrated and indexed. Houghton-Mifflin, Boston, 1938. $4.

Herbal Delights by Mrs. C. F. Leyel is indeed a book full of delights for all those who are interested in the history and uses of herbs. It is an essentially English book but will prove of great benefit and interest to American readers.

Mrs. Leyel divides the herbs which she discusses according to their primary uses. Included in the book are many recipes as well as much practical information. It is definitely a book more concerned with the use than with the growing of the plants. Broad in its scope, it includes spices, natural perfumes, and cosmetic herbs. Many of these are, of course, tropical plants too tender for our northern gardens but nevertheless obtainable at the groceries and drug houses.

It is difficult to understand anyone as well versed in herb lore as Mrs. Leyel listing chervil as "*Myrrhis odorata* or Sweet Cicely." Also, we on this side of the water may feel that she is inclined occasionally to attribute over-extensive medicinal powers to the plants, but that is a matter of individual opinion. Certainly this book is outstanding in its field and should be in the library of everyone interested in herbs. It is well indexed and bursting with information.

MRS. ALFRED G. KAY.

Floriculture for the Experienced

COMMERCIAL FLOWER FORCING. Alex Laurie & G. H. Poesch. Second edition. 557 pages, indexed and illustrated. Blakiston, Philadelphia, 1939. $3.

The second edition of Commercial Flower Forcing, like its predecessor, has been designed essentially for the experienced gardener. Though it may be used and readily understood by the beginner, its true value rests in its usefulness as a guide for professional gardeners or as a text book for the student of floriculture.

With professional and scientific aid from many sources, the authors have admirably treated their subject in a truly complete and up-to-date fashion. One might say they have hardly left a pebble unturned. In the opinion of this reviewer, their book has covered one more subject and filled one more vacancy in an

imaginary list of ideal American horticultural works.

The material is arranged in text-book fashion, with a comprehensive list of references at the end of each chapter. Numerous tables and charts have also been used. Particularly interesting is the chapter on fertilizers, as it covers a complete discussion of an extensive list, giving their origin and composition as well as their uses. Supplementing this are lists and tables of plants with recommended fertilizer treatments.

Many of the more recent developments in floriculture have been discussed in similar fashion, such as the use of additional light (or, as frequently termed, the lengthening of the day), which may be used to induce the earlier flowering of greenhouse crops. Here again comprehensive tables are used to show the effect of various treatments.

Among the innovations in the horticultural trade, soilless culture can hardly be slighted. It has found a place in Chapter 4, but has scarcely been treated as completely as other topics. The principles of soilless culture have been adequately presented, however, showing advantages and disadvantages of the method. The final working details may have been omitted because of inadequate information at the time of writing.

Books of this nature with such a wealth of information presented in such a clear concise fashion should find their place in the library of every gardener and student of floriculture.

JOSEPH W. TANSEY.

Botanic Gardens and Their History

BOTANIC GARDENS OF THE WORLD. [C. Stuart Gager.] Second edition. Brooklyn Botanic Garden Record **27**: 151-406. 1938. $2.50.

In view of the long-felt want, it is strange that the botanical world has been obliged to wait so long for a full enumeration of all of its gardens, with a concise description of each and a summary of its history. Yet no such record made its appearance until the summer of 1937, when Vol. 26, No. 3, of the Brooklyn Botanic Garden Record (**26**: 149-353) was devoted to it.

As might be expected in a pioneer effort of this kind, the first edition was marred by numerous errors of various kinds, some of them glaring ones. For instance, the main classification was by countries, alphabetically arranged; but "Irish Free State" was inserted between Japan and Java; Cernauti, Roumania, was placed in Austria, "Montreux (Vaud)" and "St. Croix (Vaud)" in France, "Bourg St. Pierre (Valais)" in both France and Switzerland, and Valetta in both Malta and Italy. Singapore was given with some detail under Federated Malay States, where it does not belong, and with a few lines only under Straits Settlements, where it would naturally be sought.

The second edition followed the first in one year; it contains some additional gardens, and the descriptive and historical matter has been expanded from 206 to 256 pages. Many of the worst errors have been corrected, but by no means all. Disko still figures under Denmark (as well might Cape Town and Melbourne be listed under Great Britain). One finds "Dutch East Indies. See Netherlands East Indies"; but when one follows this up, he finds "Netherlands East Indies. See Java and Sumatra." (There is no such heading as "Java and Sumatra"; each island is separately entered in its alphabetic sequence.) Essentially identical information, but with inconsistencies, is conveyed by the last two lines of page 200 and the first two of page 201.

Should we be favored with a third edition of this very useful work, there will be plenty of room for further correction of errors. But far more important is the provision of a table of contents, or an index of places, or both, for the search for any one garden involves considerable waste of time. A judicious use of running-heads at the tops of the pages would also be useful.

There have been enumerations of the world's botanic gardens, scattered through lists of other institutions devoted to plant science, as found for instance in the three editions of Dörfler's Botaniker-Adressbuch (1896, 1902, and 1909), in the International Address Book of Botanists (1931), and in *Chronica Botanica* (1938); but none of these presents any descriptive or historical data, and the last two do not even give the name of the responsible head of each institution. The present work, therefore, is of inestimable value as a reference handbook of botanic gardens.

J. H. BARNHART.

For the Home Gardener

YOUR GARDEN THIS WEEK. Ben Blackburn. 230 pages, illustrated, indexed. Rutgers University Press, New Brunswick, N. J. 1939. $1.

Week by week, through an entire year, in this volume Mr. Blackburn attempts to guide the amateur gardener logically, offering a wealth of valuable suggestions and much sound advice.

His emphasis upon the pH factor of soils and use of commercial fertilizers, rather than upon a thorough soil preparation, which includes deep trenching with plentiful use of organic fertilizers such as barnyard manures, and his frequent stress upon *what* to do without always telling just *how* to do these things, tend to throw some of the subject-matter out of balance. Recommendations for the use of heavy mulches, the introduction of an elaborate spraying schedule, the sprinkling of dahlia roots in storage to induce new growth, and the use of salt hay a second year, are unsound suggestions for a beginner in gardening.

The book contains so much good useful information that it is regrettable that it must be accepted with even these reservations.

HOWARD W. SWIFT.

Genetics Brought Up to Date

RECENT ADVANCES IN PLANT GENETICS. Second edition. F. W. Sansome and J. Philip. 412 pages, illustrated. Bibliography, key to literature, and index. Blakiston, Philadelphia. 1939. $5.50 in cloth.

The second edition of Recent Advances in Plant Genetics was written by one of the authors of the first edition and it continues in the style of treatment and with the scope of the edition which was published in 1932. Since that date publications on important investigations in plant genetics have continued at a truly phenomenal rate. The new edition summarizes under appropriate subjects these advances in the knowledge of genetics in plants. Several chapters have been rewritten, others have been revised and a chapter on Variegation and Chimaeras has been added. There is an extensive bibliography and several pages of a key to the literature.

A. B. STOUT.

Epimedium and Its Relatives

EPIMEDIUM AND VANCOUVERIA (Berberidaceae), a monograph. William Thomas Stearn. Paper covered. From the Linnean Society's Journal—Botany, vol. li. (No. 340), Pages 409-535. *Plates 24-31.* Indexed. 28 November 1938.

Mr. Stearn has done a remarkable thing in this important taxonomic monograph by producing a really interesting and readable account of a horticulturally important group of plants. *Epimedium*, in its various species, is increasingly grown in our gardens and often under erroneous specific names.

Aceranthus is here treated as a subdivision of *Epimedium*, but *Vancouveria*, with three species, is presented as a separate genus. Under *Epimedium*, 23 species are described, with 10 subordinate categories and 11 horticulturally distinct plants of supposed hybrid origin.

The studies of Mr. Stearn enable anyone to check the names of his plants and also will undoubtedly encourage their wider cultivation.

H. A. GLEASON.

Current Literature At a Glance*

By Virgene Kavanagh

Trees in Connecticut. "Practical Forestry and Forest Trees of Connecticut," issued by the Connecticut Forest and Park Association, contains simple descriptions and outline drawings of the leaves, fruits, or flowers as they are needed for identification of the common trees in the eastern United States.

For Poison Ivy. Calcium chlorate sprayed or dusted onto the leaves of poison ivy is supposed to kill the vine; a second dose several weeks later may be necessary to finish the destruction.—*Real Gardening*, July 1939.

Conservation. The "Conservation Guide" compiled and published by The Garden Club of America, 598 Madison Ave., New York City, is a valuable source book for material on conservation.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

For Sneezers. Hay fever victims will be interested in a bulletin from the Squibb laboratory. It is a geographical and botanical survey on hay fever with suggestions for treatment with pollen allergen solutions.

Transplanting. Yuccas can be transplanted more satisfactorily if most of the leaves are removed, and they will bloom much more quickly than specimens grown from seed.—N. F. Peterson in *The American Botanist,* July 1939.

Midwestern Flora. "Flower Pageant of the Midwest" by E. S. and F. E. Clements and "Floral Garlands of Prairie, Plain, and Woodland" by E. S. Clements together constitute a real contribution to the floral studies of an area not well covered in popular literature. There are 125 colored illustrations in the *National Geographic Magazine*, August 1939.

Foundation Planting. E. L. D. Seymour, writing in the *American Home* for September, strikes at the type of plants which are frequently used for foundation plantings, saying that one cure for the customary bad practice is education and higher standards of professional service. Another is the development of a general awareness of what is good and why . . . that is, education of home-builders as well as nurserymen.

Early Tools. The July number of the *Herb Journal* has a picture of the tools used by the older herb gardeners and an account of the way in which some of these gardens were managed.

Plant Names. "Horticultural Nomenclature" summarizes the rules for naming horticultural varieties of plants and lists generic names to be retained and others to be included under other genera.—*Monthly Bulletin of Agricultural Science and Practice,* July 1939.

Bulletins. The library is completing its files on the bulletins of the State Agricultural Experiment Stations; information on an almost infinite variety of subjects is accumulating. The bulletins on plant diseases, insect pests, fertilizers, and new varieties are numerous and will be of interest to gardeners.

Notes, News, and Comment

Park Conference. The Third National Park Conference of the American Planning and Civic Association will take place with National Park officials at La Fonda Hotel, Santa Fe, New Mexico, Oct. 8-10. The meeting will be followed by a thousand-mile motor tour, lasting a week, to the southwestern national parks and monuments.

Visitors. Among the August visitors to The New York Botanical Garden were George E. Wheeler of the University of Pittsburgh; Doris W. Hayes, U. S. Forest Service; Mary Elizabeth Pierce, Brooklyn Botanic Garden; Carl Skottsberg, Gothenburg, Sweden; Clair A. Brown, Louisiana State University; F. A. Barkley, Montana State University; M. J. Reed, Notre Dame; John R. Shuman, Purdue; W. M. Fifield, Subtropical Experiment Station, Homestead, Fla.; Elbert J. Little, Jr, Southwest Forest and Range Experiment Station, Tucson, Ariz.; Gunnar Degelius, Uppsala, Sweden; Jaime Villegas Duque, Escuela de Agricultura, Cali, Colombia; G. E. Thompson, University of Georgia; Robert E. Lee, Ithaca; G. J. Dufrenoy, Faculté de Sciences, Bordeaux, France; Ilda McVeigh and William A. Albrecht, University of Missouri; J. T. Buchholz, University of Illinois; H. C. Eyster, University of South Dakota; Willard N. Clute of Indianapolis; F. W. Pennell of the Academy of Natural Sciences, Philadelphia; Rufus Cole, Rockefeller Institute; Mr. and Mrs. Robert V. Boucher, Pennsylvania State College, and M. L. Fernald of Harvard University. Late in July Norman W. Todd of Mississippi College was a visitor.

Scouts. Forty-three children from the East Van Cortlandt Girl Scout Day Camp made a tour of the Garden Aug. 4 under the guidance of a member of the staff. For many of them, their director indicated, this was the first close contact they had had with living plants outdoors.

Beech. The Federal Writers' Project, in preparing material for the recently published "New York City Guide" discovered the famous weeping beech (*Fagus sylvatica pendula*) at Flushing, said to have been brought from England by Henry Parsons in 1845 or '47. "The

tree's foliage is now 340 feet in circumference, 92 feet in diameter and 69 feet high, and almost perfectly symmetrical," a news release from the Project states. Planted at what is now Washington Place, between Bowne and Parsons Avenues, the tree is now cared for by the City Park Department.

Lectures and Trips. Dr. A. C. Smith addressed the Matinecock Garden Club, which is an Affiliate of The New York Botanical Garden, Sept. 8, speaking on "Our Native Ferns." During the summer Dr. H. N. Moldenke has led field trips for the Torrey Botanical Club and other groups to the Watchung Mountains, Seeley's Notch, the Bartlett Tree Research Laboratories (with Dr. Stanley W. Bromley) and to the Nathan Straus estate at Valhalla, through the courtesy of Mr. Straus, with Ernst Hoelle as co-leader. "Fundamentals of Gardening Practices' was the subject of T. H. Everett before the Yorktown Garden Club July 19.

Scholarship. Dr. Anna E. Jenkins of the Bureau of Plant Industry in Washington has been working during the past month on a scholarship at the Botanical Garden, studying the morphology of a parasite (*Stevensea*) of *Opuntia*. The work, which is being carried on partly in co-operation with Dr. A. A Bitancourt of São Paulo, Brazil, is under the joint direction at the Garden of Dr. W. J. Robbins and Dr. B. O. Dodge.

Window. The story of the giant krubi (*Amorphophallus titanum*) was told in pictures in the windows of the Franklin Society for Home Building and Savings on Broadway and Vesey Street for two weeks during July. A lesson in thrift which was posted beside the display of photographs said in part: "Like the krubi, your savings will grow to a surprising size if allowed to grow systematically for about 7½ years . Unlike the krubi, your savings will not die away, leaving only a rotted root and sterile seeds, but will continue to flourish for as long a period as you may wish."

Orchids. According to a recent check in the greenhouses, The New York Botanical Garden's orchid collection at present includes 97 genera, 426 species and natural varieties, and 142 horticultural varieties. In addition to these labeled plants, there are 382 undetermined plants, of which 150 are not yet referred to a genus. Most of these are recent acquisitions which will be identified as soon as they can be studied after blooming.

Herbals. A means of making some of the old herbals available to people who, even if they could pay the large prices demanded, could not even obtain most of these rare volumes, has been launched this year. Mrs. Rosetta E. Clarkson, who publishes the Herb Journal at Milford, Conn., has organized an Herb-Lovers Book Club, the dues for which bring each member up to three reprints of rare old herbals, gardening books, or still-room books each year.

The first reprint to be issued was Coles' The Art of Simpling (1657). Last month Hyll's The Gardeners Labyrinth (1652) was sent to members. Toilet of Flora is contemplated for the next reprint. Some of the larger herbals are in mind for future production.

Address Book. Workers in plant taxonomy, geography, and ecology, are to be listed in a new address book being prepared by *Chronica Botanica*. The book will contain a conspectus of current and planned research, and will include names of scientists doing research in such fields as agronomy, forestry, horticulture, palaeobotany, and phamacognosy, though in all fields it will be restricted to those who are actively carrying on research. Questionnaire cards for the inclusion of names may be obtained without charge from the editor of *Chronica Botanica*, P. O. Box 8, Leiden, Holland.

Fern Personality. There has to be a "first" for everything! As Treasurer of the Torrey Botanical Club, Dr. H. N. Moldenke recently received a check for $1.50 from the Franklin Square Subscription Agency, New York City, made payable to the order of *"Botrychium Lanuginosum."* The address given for Mr. Botrychium Lanuginosum was "Torrey Botanical Club, New York City." The check was duly endorsed by the treasurer (acting as attorney for Botrychium Lanuginosum) and deposited! It represented payment for a Torrey Club publication on the fern whose name was used.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

October, 1939

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A SPECIALIZED MUSEUM

Fame sometimes comes from afar, and an institution may learn of its unique qualities away from home.

It is in an impressve three-volume publication coming from Washington, entitled "The Museum in America," that we learn that, because of The New York Botanical Garden, New York stands at the top of all American cities for its collections of recent plants (*recent* as opposed to *fossil*), and that it apparently contains the country's only public museum devoted to plant life exclusively.

Laurence Vail Coleman, Director of the American Association of Museums, says that though in the science field one might expect to find special museums of geology, palaeontology, ornithology, and entomology, and museums for different regions of the earth, except for herbariums and museums of anthropology, the only specal public museums of science are at The New York Botanical Garden and in California, where there is an African museum.

Later he comments: "For the field of science as a whole, the top cities are Washington, New York, Cambridge, and Chicago. Washington is first for rocks and minerals, fossil plants, fossil invertebrates, recent invertebrates, fishes, and mammals. New York is first for fossil vertebrates and recent plants and birds Two museums. the National and the American, hold all these records except the one for recent plants, which is held by The New York Botanical Garden."

The story might go further. An investigation reveals that, so far as is known, there is no other public institution in New York City, outside of the Brooklyn Botanic Garden, which maintains a plant pathologist on its staff or a mycologist who is concerned with the higher fungi, such as the mushrooms and their relatives

The Garden has two such persons on its staff, making it a principal source of information in New York on the identification of the fungi and on diseases of plants, their prevention, control, and cure. Institutions as well as individuals turn to The New York Botanical Garden for authoritative information on fungi, which are only one of the forms of plant life falling within the scope of the Garden's work.

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The Making of a Flower Master

*By Ervin S. Ferry**

IN Kyoto, that ancient capital of Japan, the flower masters are still pursuing the historic art of flower arrangement and teaching it to qualified groups of students. In their schools the pupils learn to design arrangements for home decoration, giving careful attention to their appropriateness for the season or for special festive occasions. Some of the compositions represent a classic poem or story; others are more personal, suggesting "welcome," "a happy journey," or that most popular wish in every land, "prosperity and long life."

Nearly every young Japanese woman and many men learn the art of flower arrangement. In a beginners' class the pupils are rather flippantly called "ladies in waiting." These are mostly girls of social standing who have finished school and who are occupying their leisure time before marriage in the pursuit of the cultural arts. In most cases their interest in flower arrangement is for home decoration rather than in the symbolism or the principles on which the art is based. They have already learned something of the various schools of the art and can readily select that one which most nearly fills their need. (This use of the word "school" is that with which we are familiar in expressions such as the school of Titian, the pre-Raphael school, etc.) There are hundreds of schools of flower arrangement in Japan, some of which started centuries ago in Buddhist temples, but the greater number are recent off-shoots of these ancient institutions. The oldest and largest of the schools is the Ikenobo, which dates back to the seventh century and now numbers about a million and a half of enthusiastic living devotees. Another large school is the Saga, some two centuries younger than the Ikenobo. The policies and management of most of the ancient schools are controlled by temples, those of modern origin by a headmaster whose succession is either hereditary or by appointment from his predecessor.

* Professor Ferry, who is a master of the Ikenobo, the Saga-onryu, the Misho-onryu and the Kado-Senkei Schools of Japanese Flower Arrangement and an honorary member of the Japan Flower Artists Association, is the author of "The Japanese Art of Arranging Flowers for the Home," which appeared in this Journal in April, 1939.

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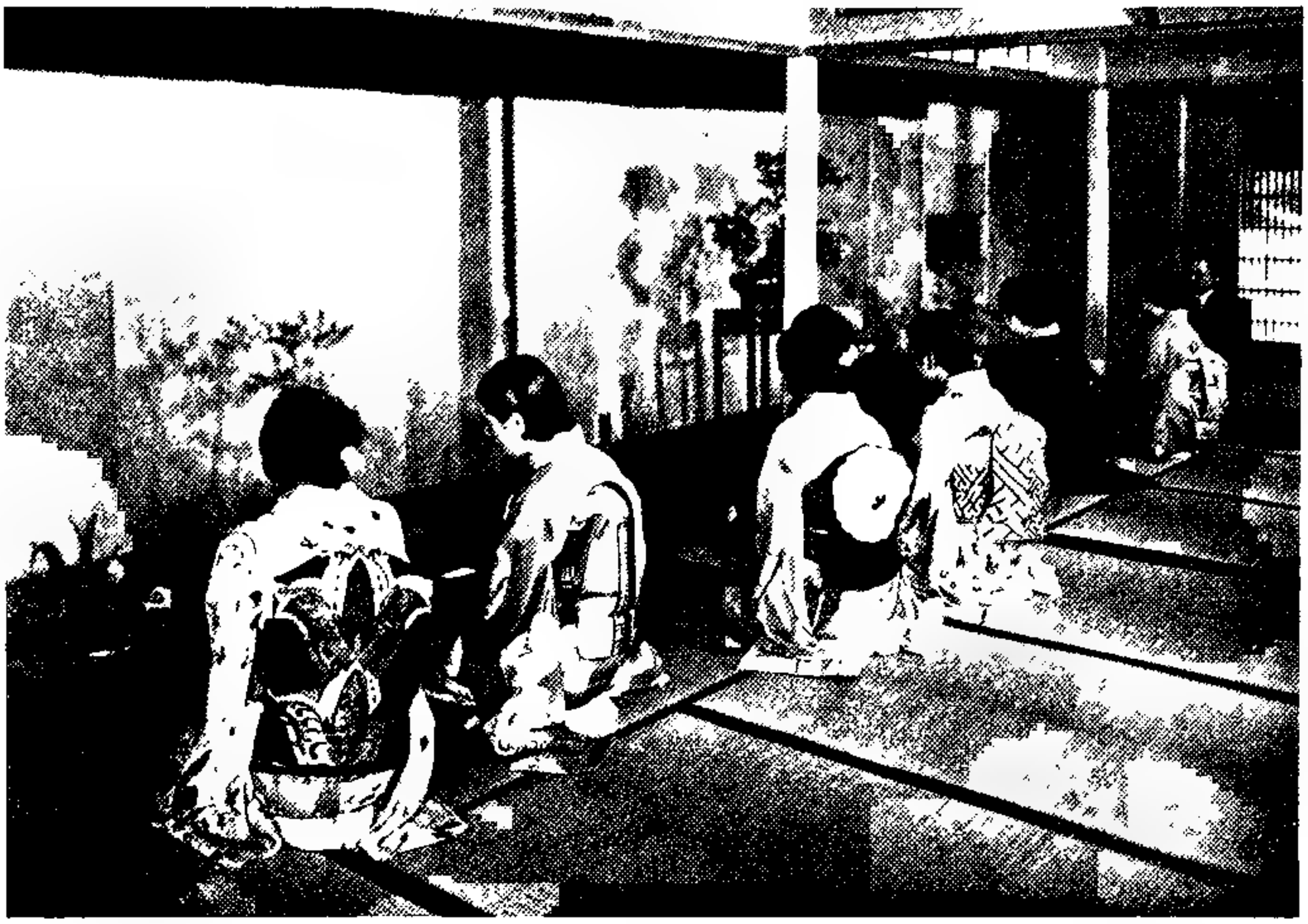


A group of young women in a Japanese school for flower arrangement examining an exhibition by one of their fellow students.

A School is Visited

As one arrives at the gate of the master's house the recently swept and sprinkled stepping stones from the gate to the house indicate that guests are expected. At the wide-open entrance a waiting maid makes an obeisance, kneeling and bowing her head to within a hand's breadth of the floor as she bids the visitors enter. After having removed their shoes and deposited them on the step the guests are ushered up a steep flight of polished stairs into a large room, where they again are greeted in the same ceremonious manner by the master himself.

The room is without table or chairs and the floor is covered with mats called "tatami," in shape like rectangular planks six feet long by three feet wide and an inch and a half thick, made of tightly twisted and stitched straw covered with a fine matting material, the edges bound with figured cotton or silk braid.

At the corner furthest from the entrance is a small recess or alcove about the size of one or two of these mats. On the rear wall of this "tokonoma" hangs a picture scroll, or "kakemono," in front of which is a single vase with an appropriate flower arrangement. On the floor around the sides of the room extends a row of flower vases. In front of each

vase is a thin cushion and a tray containing a bundle of flowers and an apron of rubberized cloth.

A couple of young women enter, dressed in light-colored kimonos and beautiful obi. After greeting the master with the formal obeisance, they repair to the tokonoma to view the flower arrangement which is the model for the day's lesson. Sinking to the floor as lightly as falling leaves, they examine the arrangement in the manner prescribed by etiquette. First, they note the shape and color of the vase and the base on which it stands. Then the eyes move upward along the basic lines of the arrangement, noting the unity, the rhythm and the harmony of the curves and colors. This done, the kakemono is viewed with regard to the harmony of its lines, colors and sentiment in its relation to the flower arrangement.

The pupils now repair to their places, adjust themselves comfortably on their heels, cover their laps with the small aprons and set to work to reproduce the model. Are they not afraid they may soil their light-colored dresses while kneeling or moving about the floor? No fear of that. The mats in their own homes and in the homes of all their friends never have been touched by shoes. Moreover, the mats are brushed and wiped with a damp cloth several times a day. They are cleaner than "hospital clean."

The master waits some fifteen minutes or so to give the students oppor-

Japanese students attending a seminar in flower art.

tunity to work on their own initiative. He then moves from one student to another, making suggestions about the work done. In his second round he makes needed changes with his own hands. The student now takes apart her arrangement and makes it over. Again the master inspects it, giving his final comments. The student now packs up her material and takes it home for further practice.

After some twenty or thirty lessons the student has learned something of the standard forms of the two simpler basic styles, the Nageire and the Moribana. This purely inductive method or "learning by doing" is commonly employed in the elementary classes. For most schools there are no text books or written directions throughout a course of study extending over several years. There are a few schools, however, with many advanced students, which supply a text book upon the completion of each stage in the course. In all cases the book comes only *after* the student has completed the work covered by the book.

A Class for Teachers

Sometimes a group of school teachers will arrange to have a master give them a lesson each week in their school building. This master uses a method which combines induction and deduction. The lesson starts with a half-hour lecture on art forms employed in some one style of arrangement or, perhaps, on the variations in the form of some variety of plant in successive seasons. The master makes diagrams and sketches on the blackboard. He then constructs an arrangement in which the forms and principles previously outlined are illustrated. The students take notes on the lecture, make sketches of the composition before them and then return to their places to copy the model. Twice during the period the master examines their work. This inductive-deductive method is especially popular with foreign students as well as with more advanced Japanese students.

Symbolism and Technique

There are three basic styles commonly taught—the Nageire, the Moribana and the Kakkwa. This last requires much more time and skill than either of the others and is either omitted or treated briefly by most modern schools. Each style has many variants. The Saga school, for instance, distinguishes thirty variants in the Nageire style. An advanced student of some of the ancient schools is expected to study the habits of growth of a number of species of plants; thus, the Ikenobo school has issued a book illustrating fifty ways to arrange different varieties of iris according to their forms of leaf and blossom at different seasons.

Symbolism is an important feature in the instruction of some schools, whether the arrangement is designed to express different emotions, suggest different ideas, or to be used in compositions suitable for different occa-

sions. This study is so detailed that one finds even entire books of designs for arrangements expressly adapted, for example, to the celebration of New Year's Day.

The advanced student learns methods to delay the wilting of plants, the technique for bending branches and manipulating foliage, the method to be employed for clipping and finishing a composition to exhibit balance and rhythm. There are many unusual details of design which may be employed to produce certain effects with which the advanced student is expected to familiarize himself. Such items the masters call "secrets" because they are not given to the student until he is well advanced in his studies. All of these so-called secrets are freely disclosed to anyone whom the master considers qualified to use them.

Becoming a Flower Master

A student who continues with a school that practises all three of the basic styles till such time as he has made not less than 250 satisfactory compositions may become a candidate for the degree of Flower Master of that school. Less than half of this amount of work is required to obtain the same degree from some of the modern schools that do little with the more difficult Kakkwa style. On the completion of the requirements for

The chief priest of the Daikakuji temple at Kyoto conferring upon the author the degree of Master of Flower Art, according to the Saga school.

the degree it is customary for the candidate to give a public exhibition of the compositions of the styles studied. All of the student's friends and those of the master are invited. Young lady fellow students, trained in the graceful tea ceremony, add much to the beauty and interest of the function with their graceful manners and beautiful costumes as they serve thick tea to the guests. If the master of a school is not connected with a temple, the bestowal of the diploma of Master is usually the occasion of a party at the house of either the headmaster of the school or of the master who has prepared the student. At one of these delightful parties there may be classical vocal and instrumental Japanese music as well as exhibitions of the beautiful posturing dancing according to various classical schools, followed by a collation.

A master's diploma from a temple school is sometimes given at the temple. The candidate and the teacher who has prepared him sit on cushions facing the altar and the chief priest of the temple. In many cases, the latter is the hereditary headmaster of the school. After the teacher has made a short speech introducing and sponsoring the candidate, the chief priest gives an address of welcome full of courteous phrases and admonitions as to the duties of a flower master. He says in part: "Before beginning to arrange flowers, set your spirit in order. Bring only the purest thoughts to your work. One must have a calm and gentle mind. As the mirror reflects the face, so our composition reflects the soul. Let the art of arranging flowers teach you to revere and cherish the life and growth of human beings as well as that of plants. Be mindful not only of the beauty of nature, but also of the elevation of the spirit." He closes with expressions of hope that the candidate may have a long, active and useful life. An assistant then brings in a lacquered tray bearing the diploma, together with scrolls and books of secrets of the school. The diploma is read and a gift from the chief priest is presented to the newly made master. Thus the ceremony is ended.

Occasionally, a newly made master of the Ikenobo school, especially if he be a foreigner, is given the honor of what is called the Classical Flower Arranging Ceremony, which is performed in one of the buildings of the Rokkaku temple at Kyoto. A sliding partition is removed between two large rooms, each having a tokonoma, or recess. Around the sides of the room are seated all of one's fellow students as well as the friends among the flower masters of the school. The master of ceremonies recounts the history of the ancient ceremony and announces that the purpose of the meeting is to honor the newly made master and to give his friends an opportunity to unite in expressing their wishes that he have a prosperous voyage to his own country. Then the first participant in the ritual enters, bearing aloft a lacquered tray on which is a kakemono (scroll), carries it to one of the tokonoma, unrolls it, hangs it on the rear wall of the alcove

A student fetches flowers and instruments for making a composition in the Classical Flower Arranging Ceremony given by the masters of the Ikenobo school.

and retires. She is followed by another participant bearing on a tray a graceful stand and incense burner containing a live coal. She places the stand at one side of the hanging scroll, sets the incense burner on top of it and deposits a bit of incense on the live coal. The next participant brings a bronze vase of ancient design, places it before the picture and retires. After a pause, the master of ceremonies approaches the tokonoma, kneels, examines the furnishings, then turns to the company and announces, "Here we have a proper kakemono and an incense burner of classic design. The incense is sending out its fragrance. A bronze vase of ancient design is in position. Only one thing is lacking to make a complete composition. We need a flower arrangement. Who will supply it?" The sponsor bows acceptance of the invitation. The master of ceremonies asks for flowers and instruments. These are brought and placed on the floor in front of the flower vase. The sponsor rises, seats himself on the floor and proceeds, with the formality of the prescribed ritual, to construct an arrangement of flowering branches expressive of good omen and wishes for all blessings.

After he retires to his former place, the master of ceremonies thanks him, and continuing says, "We observe a duality in all aspects of nature. These aspects may be distinguished by such terms as positive and negative,

light and dark, masculine and feminine. The arrangement of branches in a massive bronze vase, such as has just been completed, typifies the masculine aspect. Now, we need a more slender, more suave arrangement of flowers in a lighter porcelain vase which will typify the feminine aspect. Who will furnish it?" A lady master bows acceptance of the invitation. The same ritual just enacted is repeated at the second tokonoma. This arrangement consists of chrysanthemums and expresses dignity and nobility.

The one in whose honor the ceremony has been performed now kneels in turn before each composition, examines it carefully according to the prescribed etiquette and, as soon as opportunity presents itself, expresses to each composer his appreciation of the compliment and the good wishes expressed in the composition. He also refers to any observed detail of design that seems unusual or especially significant. At the conclusion of this formal, stately ceremony, everyone relaxes, talks to his neighbor, and soon is in a mood to enjoy the collation and complimentary speeches which follow.

A qualified student ceremoniously examines a flower composition.

Propagating Tropical Shrubs By Leaf-Bud Cuttings

By John V. Watkins
Assistant Professor of Horticulture
University of Florida

THE leaf-bud cutting technique of propagation for rhododendrons, described and illustrated in the April issue of this Journal by Mr. H. T. Skinner of Cornell University, apparently can also be applied to tender plants of different families. A conference with this investigator in July 1938 suggested to the author the idea of testing this unusual method for the multiplication of certain tropical shrubs that are widely used in Florida horticulture, to ascertain the possibility of applying the method to less easily propagated material.

It will be recalled that the method involves the cutting of buds with leaves attached, exactly as though they were to be used in shield budding. If a root-inducing chemical is to be employed, the buds are dipped or immersed for a time in the solution, following directions on the package. A table presented with this article shows that leaf-bud cuttings of the tropical plants that were treated with solutions of indolebutyric acid developed heavy root systems much more quickly than did comparable cuttings that had been soaked in tapwater for the same length of time.

After immersion, the cuttings are placed in the rooting medium that has been found best adapted for that species. While immersion or dipping in indolebutyric acid is seen to accelerate the rooting of the leaf-bud cuttings, it must be borne in mind that the tapwater checks all lived and that from one to several weeks later than the treated material, they all formed heavy root systems.

To determine the best rooting medium to use, leaf-bud cuttings were set in many different mixtures. Results showed that, for most of the tropical species studied, a combination of half European peatmoss and half local sharp white sand (by volume) was satisfactory. Careful determinations of composite samples showed that the material, as used in these trials, had an acidity of pH 4.45.

In order to put the trials on a par with practice common to many of the smaller commercial nurseries, all of the tests were conducted in simple ground benches in a standard half-shade lath house. The benches were built of pecky cypress and the rooting media were filled in to a depth of six inches. Light frames of bamboo were covered with a double thickness of cheesecloth, and these were used in lieu of glass sash. The cloth frames were lifted daily for syringing and the cloth was lightly sprinkled each afternoon to maintain a high humidity. No wilting has been observed and the results with this simple equipment are highly gratifying. In the

Some typical leaf-bud cuttings and rooting responses on a selected group of tropical plants. UPPER LEFT: *Codiaeum;* CENTER: *Bougainvillaea,* LOWER LEFT: *Hibiscus, all shown just as they have been taken from the stock plant.* UPPER RIGHT: *Thunbergia grandiflora var. alba, after two weeks in the cutting bench.* LOWER RIGHT: *Hibiscus, six weeks after potting.*

△

northern Florida district, this system is most efficiently used from April through October, but on the southern end of the peninsula, year 'round use of this type of propagating frame is the rule.

When the cuttings are placed in the rooting medium, the stem tissue and the axillary bud are just barely covered, and the untrimmed leaf lies flat, allowing the stomata to be in close proximity to the constantly moist medium.

It has been shown that heavy root systems are produced much more rapidly on cuttings whose leaf area has not been reduced. It is important, therefore, with most plants that the leaves be left intact and the environment be so managed that transpiration will be kept at a minimum. As a result, wilting will be eliminated entirely. With very large-leaved plants, however, such as some of the new croton hybrids, propagators will be compelled to cut down the leaves somewhat, if they are to get the greatest value from their propagating benches.

Table showing response of certain tropical plants to the leaf-bud cutting method of propagation[1]

Name of plant and weeks required for heavy rooting	*Chemical treatment*	*No. Good*	*Rooting No. Fair*	*Response Not Rooted*	*Dead*
Azalea indica	Tapwater	0	0	10	0
variety Formosa	5mg/g talc [2]	6	4	0	0
4 weeks					
Buginvillaea spectabilis	Tapwater	3	4	3	0
variety Crimson Lake	20 ppm [3]	7	2	1	0
4 weeks					
Cocculus laurifolius	Tapwater	1	0	9	0
3 weeks	40 ppm	8	2	0	0
Codiaeum variegatum	Tapwater	2	8	0	0
variety Tortilis	5mg/g talc	8	2	0	0
3½ weeks					
Hibiscus rosa-sinensis	Tapwater	0	1	9	0
variety Single Red	5mg/g talc	5	3	2	0
3 weeks					
Hydrangea macrophylla	Tapwater	0	6	4	0
variety Otaksa	5mg/g talc	7	3	0	0
3 weeks					
Thunbergia grandiflora	Tapwater	0	0	10	0
variety Alba	5mg/g talc	8	2	0	0
2 weeks					

Scientific investigations show repeatedly that tissues of many plants in the region of buds are veritable storehouses for food materials and phytohormones. These tissues, therefore, should make good propagating material even though the amount of wood used is extremely small as compared to the standard cutting with long internodes. It is understood, of course, that the environment must be wholly congenial if a high percentage of living plants is to be obtained. It is worth noting that there were no dead cuttings either in the treated or the check lots that were a part of this trial.

An early investigator in the field of plant propagation showed that the temperature that is most suitable for the normal growth of the mature plant is a very congenial temperature for the rooting of its tips as cuttings. Such a temperature was used in these experiments. The time that is required for a leaf-bud cutting of a tropical plant to form a heavy root

1—The rooting medium was half European peatmoss and half local sharp white sand by volume. Ten cuttings and ten checks were used in each trial.

2—Five miligrams of indolebutyric acid to the gram of talc, applied as a dust to the cut surface of the leaf-bud cutting.

3—Twenty parts of indolebutyric acid to a million parts of water. The leaf bud cuttings were soaked for 24 hours before being inserted in the cutting bench.

TYPICAL LEAF-BUD CUTTINGS OF CODIAEUM (CROTON)

UPPER LEFT: *Root development after three weeks in the rooting medium of peatmoss and sharp sand.* BELOW: *The same cuttings demonstrating six weeks' shoot growth.* UPPER RIGHT: *The same plant as pictured on the right of the two groups after it had grown in a five-inch pot for six months.*

system depends upon the season, the species and variety, and the environment into which the cutting is introduced. The table indicates that several sorts formed heavy root systems in less than a month under the conditions of our preliminary experiment.

With the thought that the technique would be of little value to nurserymen if the axillary buds failed to make adequate shoot growth, rooted leaf-bud cuttings of several species of tropical plants were potted up in the regular compost used in the Department of Horticulture. Two of the illustrations attest to the fact that in these trials certain tropical species grew off in a highly gratifying manner. In fact, no variety in the preliminary trials failed to make adequate shoot growth, and every one developed into a normal plant. The callus tissue which surrounds the cut surface in actively growing cuttings resulted, in these experiments, in a rounded stem being formed exactly as in conventional cuttings.

This leaf-bud cutting technique has given gratifying results with certain varieties of Azalea, Buginvillaea, Codiaeum (croton) and Hibiscus in the trials during 1938-1939 at the University of Florida.

An eighteen-inch cane from a croton or hibiscus plant might give but four regular cuttings, whereas the same shoot might yield twenty or more leaf-bud cuttings. Generally speaking, it has been observed in these tests that it is best to take these cuttings in the spring from shoots that have become firm after the first flush of growth. This propagating material should be neither succulent, nor yet, hard and woody. The keen propagator will soon learn to know his wood at a glance.

If there is a distinctly limited amount of propagating material available, as is usually the case with rare plants, it seems that this technique should have a rather definite application in tropical horticulture as well as with the ericaceous plants in the East. Its use would be restricted almost entirely to nurseries that wish to work up a large stock of plants from a small quantity of hard-to-get propagating wood.

The Redding Hemlock Tree

By A. B. Stout

THE wild tree of the northern hemlock (*Tsuga canadensis*) which is here called the ***Redding*** hemlock is a splendid specimen of a variation or mutation with a compact habit of growth. Possibly it is the oldest and the largest of this compact type to be found anywhere. In comparison with the normal habit characteristic of plants of this species, its twigs are noticeably enlarged in diameter, much compacted, and upright rather than drooping; and also the leaves are shorter and somewhat more crowded. This particular tree is estimated to be about 55 feet tall and its crown is broadly rounded with the ends of the branches upstanding, as shown in the illustration. The single main trunk is 6 feet 8 inches in circumference at breast height, but it soon breaks irregularly and at different levels into several nearly upright branches, two of which are fully fused or naturally arch-grafted. The lateral branches arising on the central units of the framework are numerous, rather close together, and not especially large in

The broad rounded dome of the Redding hemlock in Connecticut. In front and slightly to the left stands one of the largest of its probable seedlings.

diameter. No doubt the "poor-lumber" quality of the trunk saved this tree.

At the present time hemlocks are relatively few and scattered in the locality. In the immediate vicinity of the tree there are now several smaller hemlocks of various sizes and ages. Nine of these have a habit of growth quite like that of the largest tree; six have a character somewhat intermediate; and five seem to be normal. It is said that one or more young trees of the compact habit have been transplanted from the site.

This ***Redding*** hemlock tree is well known to various persons; but I do not know of any mention or illustration of it in botanical or horticultural publications. It stands close to highway 107 near its juncture with route 53 near Redding, between Danbury and Georgetown, Conn.

Since hemlocks may readily be grown from cuttings that are treated with root-promoting chemicals, this tree will no doubt be propagated. It produces numerous cones and seeds, so probably seed progenies will be obtained. But these may not be of the precise character of the parent tree, judging from the seedlings now growing about it.

Several other individuals of the Canadian hemlock which have a dense and compact habit of growth are known. Some of these are, at least at the present time, decidedly dwarf; others are of larger size. Among these

there are decided individual differences in color of foliage and disposition of branches in the crown. A list of some 20 individuals of this general class has recently been compiled.* It is to be noted that in this list various writers have assigned Latin botanical names of purported varietal rank to the individuals and that several individuals are spoken of as unnamed varieties. Appropriate studies will, without doubt, determine and classify the precise combinations of characters involved in these different variations or mutations; but the assignment of botanical varietal names to the individuals is not justified. Such names may be applied when there is valid evidence that real varieties exist or can be obtained from seed reproduction; as, for example, is the case for the weeping type which is known as *Tsuga canadensis* var. *pendula*. The vegetative propagations of any one of these individuals merely constitute a clone, and the use of a "personal" horticultural name will fully identify the members and indicate their true status to all concerned. It is here suggested that the clone which may be derived from the individual wild tree here noted and described be known as the ***Redding*** hemlock and that any propagations from its seedlings should be kept separate and their character and horticultural values be determined through comparisons.

* The Eastern Hemlock and its Varieties, by John C. Swartley in Arborist's News. **3**: No. 4. April 1938.

One-foot lengths of branch from a normal hemlock (left) and from the Redding tree, showing the slow growth and compact habit of the latter

Recent Mushroom Poisonings

By Fred J. Seaver

POISONOUS mushrooms may roughly be divided into two categories, the deadly forms, or those which are likely to cause death unless an antidote is administered immediately, and those which are mildly poisonous in that they do not cause death, but may give rise to severe illness of long or short duration.

One of the chief offenders in the latter class seems to be the Jack-o'-lantern fungus, *Clitocybe illudens,* a description and illustration of which appeared in the *Journal of The New York Botanical Garden* for November 1938. The reason doubtless lies in the fact that the fungus occurs in such profusion, is so beautifully colored, and looks so good, it is not surprising that unsophisticated collectors should want to feast upon it, and, as McIlvaine has aptly expressed it, "turn from it with a regret that lingers." May we add that it is much better to have this regret before eating than after, as indicated by the following experiences. Within the past year two cases involving the poisoning of four individuals have been called to the attention of the writer.

Case 1. A preliminary account of this was recorded in the article indicated above. A later report from the physician in charge was as follows:

> "About one whole mushroom was eaten by the patient and immediately after ingestion of same she felt a heavy sensation in the stomach, whereupon she induced vomiting by the usual household methods, ridding herself after four or five attempts of all the mushroom she had eaten. At the time I saw her, patient was up and about but still nauseous and somewhat exhausted, most likely from the strain of vomiting, but pulse and respiration were quite normal. The vomitus at the time of my examination was clear. Throughout the day she felt somewhat tired and sleepy, but the following day felt perfectly well and has been well since."

Case 2. On September 27, 1939, a fungus referred to the writer by the Microanalyst of the Department of Health in New York City was identified as our old offender, *Clitocybe illudens.* The following detailed report on the case was later received:

> "The mushrooms were picked on Sunday morning, Sept. 17, 1939, by Mr. F., an Italian resident of the Bronx, at Kensico Dam. He shared half of them, about 3 pounds, with Mr. A., his tenant. Mrs. A. prepared them for supper at about 6 P.M. Mr. & Mrs. A. consumed but a few spoonfuls because the taste was not as it should be.
>
> On Monday, Sept. 18, 1939, Mrs. A. took sick at 8:30 A.M., and Mr. A. at about 9:00 A.M. They vomited, had diarrhea, and were in a weak condition. A physician was called in and they were both taken to a hospital. Mr. A. was sent home as his case was not a severe one. However Mrs. A was kept hospitalized until Sept. 20, 1939, and then released.
>
> Mr. F., who had intended to eat his mushrooms for lunch on Monday, Sept. 18, 1939, was informed of the sickness of Mr. & Mrs. A. But he doubted that

the mushrooms were the cause, and as an experiment he tried three and consumed them. He vomited within five minutes and then took a large glass of epsom salts. He required no medical attention."

These records are published as a warning to over-enthusiastic mushroom collectors, not to allow their appetites to triumph over their better judgment in selecting forms to be used as food. "When in doubt throw it out" is a good slogan to be followed by either the amateur or professional mycophagist.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

A Tribute to the House of Perry

WATER GARDENING. Frances Perry. 353 pages, illustrated, indexed; glossary. Scribner, New York. 1938. $5

Up to the present the literature of aquatic plants has been distressingly scattered and, as Mrs. Perry says in the preface to her book, ". . such information had to be sought in ponderous tomes in the libraries. . " So it is timely that there should be a book to cover this omission and fitting that it should be done by one bearing the name of Perry. It would be difficult to imagine a better tribute to that father of water gardening, Amos Perry, to whom the book is dedicated, for he must have done more than any living person to further this fascinating form of gardening. As an instance of his enterprise and indefatigable spirit there is the story of how he was once watching a movie in which some of the scenes took place in the African jungle. In one of the shots he noticed growing by the waterside a plant he could not recognize and which seemed to him a really worth-while garden subject. He wrote to the producer of the film, found out exactly where the shots were taken, and after a welter of correspondence managed to find someone in the district to collect seeds and send them home to him.

The gap which his daughter-in-law has filled in the gardener's bookshelf is wide and comprehensive and she may well be inundated with an avalanche of grateful thanks showered on her by all who lay eyes on her book. In the 353 pages she has managed to run the whole gamut of water gardening. Here is an account of its early history and beginnings; every detail of how and where to make an artificial pool or convert an existing stream; full and clearly classified descriptions of all the plants to grow in or near the water, how to plant and propagate them and how to treat them in sickness; a special chapter on aquaria and another on the fish to keep and the scavengers, those dustmen of the pool whose lot it is to live on the foulness of the water and keep it clear. There seems nothing left out and there are many entertaining suggestions such as growing the baby waterlilies in a bowl in the house and making a water garden in the back yard by sinking tubs in the ground.

The plans and photographs are copious and there is a charming foreword by E. A Bowles.

JOSEPH J. ELLIOTT.

Shrubs for Adornment and Ease of Culture

THE FLOWERING SHRUB GARDEN. Michael Haworth-Booth. 174 pages, illustrated with photographs, indexed. Scribner, New York, 1939. $5.

For the person who wants to have flowers without giving them the care required by annuals and other herbaceous plants, The Flowering Shrub Garden is an excellent book. It is full of suggestions for the selection and arrangement

of flowering shrubs which will adorn the garden at all seasons of the year.

The author discusses the planning, construction, planting, and care of the shrub garden and tells in which month to look for flowers, fruits, and colored leaves. The photographs have an added value because they all were taken in a garden instead of in a studio.

Though the plants mentioned are mostly species grown in Great Britain, hence not often suitable for the climate around New York, there are some which are worth a trial from Virginia southward, where they would no doubt prove successful.

The author is a practical gardener, whose experience comes from many years of trial and error, and he is free to admit his mistakes of the past for the benefit of the reader who also is trying to learn. It is unfortunate that he has been so careless in the spelling and capitalization of some of the botanical names. Nevertheless, this is a worthwhile book for the person who wants to know about more interesting flowering shrubs for his garden.

RALPH PINKUS,
Arboretum Foreman.

An Invaluable Work on Lilies

LILIES FOR AMERICAN GARDENS. George L. Slate. 257 pages illustrated, indexed. Scribner, New York, 1939. $3.50.

This book comes nearest to fulfilling the needs of American lily growers of any book yet published on the subject. The chapters on the history of lily culture and the lily plant are well calculated to arouse the interest and to properly orient the gardener who is just beginning to grow plants of this interesting genus. The author discusses in an authoritative manner the many questions which are certain to confront the grower of these plants. Selection and purchase of bulbs, methods of planting, types of soil, location of planting site and subsequent care of the plants—all these subjects are treated in a way that bespeaks the author's first-hand experience as well as his thorough training in horticultural science.

Few gardeners can resist the impulse to attempt hybridization work with the species of lilies which they may have. Mr. Slate recognizes this fact when he states, as the opening sentence to a chapter devoted to breeding, "Lilies are perhaps the most promising group of garden plants awaiting the hybridizer." The species are discussed in natural groupings and those crosses which have been successful are indicated, thus giving direction to the amateur.

The author has not hesitated to call a spade a spade when it comes to the question of disease in lilies. Those species such as *L. Batemanniae* and *L. speciosum album* and hybrids such as ***Princeps*** and ***George C. Creelman,*** which are believed to be 100 percent infected with virus disease are so labeled. Likewise, such species as *L. Hansoni*, *L. Martagon*, and *L. Henryi* are justly credited with being nearly always virus-free.

All this material is presented with the thoroughness and practicality which one would expect from a research horticulturist who has made lily culture his avocation. The author, besides his practical experience, has had the added advantage of association with his father-in-law, the late E. H. Wilson, who conducted several plant explorations into remote parts of China, discovered and introduced *L. regale* into the trade, and became an authority on the genus *Lilium*. This book with its splendid illustrations will be found invaluable by the amateur and specialist alike.

E. P. IMLE,
Boyce Thompson Institute for Plant Research, Inc.

Ideas for the Small Home Owner

GARDEN PLANNING AND BUILDING. H. Stuart Ortloff and Henry B. Raymore. 244 pages, illustrated with photographs, sketches, and plans, indexed. 1939. $3.

Garden Planning and Building is just what the title implies, a discussion of the foundations of a good and lasting garden.

It stresses the necessity of a complete plan to begin with and goes into detail on such subjects as a basic landscape design, grading, drives, walks, steps, fences or walls, drainage, and soil—all problems that should be solved before selection of plant material or color schemes.

In the first chapter the authors discuss the selection of a homesite and the relation of the house and garden. One paragraph is rather disconcerting for the owner of a small suburban home, for it states: "No home should be built on

less than half an acre, and an acre or two acres would be better."

However, as we read on about the plans for this ideal garden there is much that is suggestive for the small place—good practical ideas and inspiration.

The last chapter is a brief for the landscape architect, giving strong arguments for calling him in as an expert to plan the garden. He will have academic and practical knowledge of design, engineering, and plant material, the authors maintain, saying: "Many hold that even on the small place a knowledge of design and engineering is more vital to success than a knowledge of plants."

There are suggestions on how to select a landscape architect, what to expect from him, how he goes about his job, and also something of the probable cost of his work.

FLEDA GRIFFITH.

Lectures on Proteins

PROTEIN METABOLISM IN THE PLANT. Albert Charles Chibnall. 306 pages, 21 figures, 3 plates, index. Yale University Press, New Haven, 1939. $4.

This volume is based on the Silliman Memorial Lectures delivered at Yale University by the author. These lectures are given annually in memory of Mrs. Hepsa Ely Silliman on the income from a fund of $80,000 left in trust by her children. Each annual course of lectures is the basis of a volume to form part of a series constituting a memorial to Mrs. Silliman. There are now 27 volumes making up a notable contribution chiefly to biology, chemistry, and astronomy. One cannot help admiring the intelligence which chose to perpetrate the memory of a loved one through such a memorial.

The present volume is a scholarly and exhaustive treatment of the subject. Much space is given to the author's own researches, but due attention is also given to those of others. Ninety-four tables are included in the text; there is a bibliography of 370 entries. Reproduction of photographs of nine notable investigators in the field add to the interest of the book.

The first chapters deal with protein metabolism in seedlings. These are followed by chapters on asparagine and glutamine formation in seedlings, the mechanism of amino acid and protein synthesis in plants, the preparation of proteins from leaves, the proteins of pasture plants, protein metabolism in leaves, the role of proteins in the respiration of detached leaves, and the regulation of protein metabolism in leaves. After perusing the book one regrets that the author did not choose to include a chapter summarizing the present status of the subject, as the average reader is likely to find the detailed presentation somewhat confusing and tedious.

W. J. ROBBINS.

Soilless Gardening

GROWING PLANTS WITHOUT SOIL. D. R. Mathn. 137 pages, 14 figures, index. Chemical Publishing Co., New York, 1939. $2.

This book is a brief popular presentation of methods of growing plants in solution or sand culture. There are 67 pages divided into 22 chapters, besides an appendix of 70 pages. Less than 50 pages are devoted to the subject given in the title. There is included in the book a page on how to make cuttings, 3 pages on grafting, some information on auxins, 3 pages on the construction and operation of greenhouses, a planting calendar, atomic weight table, a brief discussion of vitamins, some microchemical tests for various elements, a list of state flowers, a list of the agricultural experiment stations, and numerous other items of information more or less related to the subject discussed.

W. J. ROBBINS

Fertilizers and Their Functions

HANDBOOK OF FERTILIZERS. A. F. Gustafson. Third edition. 172 pages, illustrated, indexed. Orange-Judd, New York, 1939. $1.75.

A highly technical subject is presented here, primarily to farmers, in a practical and useful "handbook" style. The author's specialized technical training in the field of soils and fertilizers assures the authenticity of the book. His own experience in farming and his years of contacts with farmers' soil and fertilizer problems in his extension work have fitted him to select the most significant, applicable, and needed scientific facts in this field and to present them clearly and concisely.

When necessary to use technical terms they are explained either in the text or in footnotes. Interspersed throughout the text will be found recommendations to home owners for their lawns and gardens. Rates of application of fertil-

izers are given per 100 square feet as well as per acre.

The first chapter gives a general review of all of the requirements for good plant growth. It then takes up in some detail the essential plant nutrients, including manganese, copper, boron and zinc, which have been added to the list of essential elements in recent years.

The content includes sources, manufacture, and most profitable uses of the three most important types of fertilizers —nitrogenous, phosphatic and potassic. The author says, "Each element has its own particular function in, and effects on, plant growth." He states these particular functions briefly and clearly

The principles and best practices involved in selecting, buying and applying factory-mixed commercial fertilizers are given, as well as specific directions for the home-mixing of fertilizers.

Concluding chapters on lime and the organic matter of the soil in relation to the use of fertilizers are of prime importance to anyone who grows plants.

This concise little book of less than 200 pages is packed with authentic and usable information about fertilizers and their use. Besides the direct style of writing, the excellent set-up of the text, the photographic illustrations and the detailed index all contribute to the usefulness of the book.

F. C. HERSMAN,
State Institute of Applied Agriculture on Long Island.

On Scale Insects

ATLAS OF THE SCALE INSECTS OF NORTH AMERICA. Series II. G. F. Ferris. 132 numbers. Stanford University Press, Stanford University, California. London: Humphrey Milford, Oxford University Press. 1938. Unbound $7.75, bound $8.75.

The plan adopted for the first series of this monumental work on scale insects has been continued in the second series, which includes the four tribes (Diaspidini, Odonaspidini, Xanthophthalmini and Aspidiotini) of the subfamily Diaspidinae. Some 130 species under thirty-four different genera are described in technical terms and the important specific differences are well illustrated. This is a highly technical work and those who are interested in the control of scale insects on ornamental plants would not be able to obtain much practical information from this source When the work is completed, however, it will be indispensable for the specialists.

B. O. DODGE.

Mushrooms

SOME EDIBLE MUSHROOMS. Nina Lane Faubion. 127 pages, indexed and illustrated. Binfords and Mort, Portland, Ore. 1938. $1.35.

The object of the mushroom primer recently issued by Nina Lane Faubion is apparently merely to "whet the appetite" of mushroom lovers, hoping that through this they will be guided to consult more extensive works on the subject. The author quite fittingly introduces the work with a warning to the beginner to shun the deadly forms which are described and illustrated. A discussion of a few of the edible species follows, with illustrations.

FRED J. SEAVER.

A Sentimental Journey In "Evergreenia"

SAGAS OF THE EVERGREENS. Frank H. Lamb. 364 pages, 76 illustrations, bibliography, index. Norton, New York. 1938. $3.50.

Here is a book for the tree lover, valuable, if for nothing else, for its fine illustrations. The famous big trees of the world are herein portrayed in truly excellent photographs. Human interest, history, legend, travel, and industry, with an occasional touch of science, combine to make this a book that will appeal to the lay public.

"Grandfather" Ginkgo is introduced with due respect as the aristocrat of "Evergreenia", the corporate group of coniferous evergreen trees, so-called. Much more of general interest could have been told the reader about the ginkgo than was vouchsafed by the author, and we felt a distinct jar after the inspired elevation to which we had been raised by the author's recital of the ginkgo's impressive past, when we were briefly told that aside from the demand for the nuts, "Economically, old Ginkgo is a flop." It is an undignified and overdrawn statement. This account is followed by the story of the "Antipodean Patriarchs"—old trees of New Zealand to you!—in which the kauri tree features. Then in stately sequence come

the sequoias and our "Japanese cousins" comprising the sugi (Cryptomeria), the hinoki (Chamaecyparis), and others together with "Asiatic acquaintances" from across the Yellow Sea. The relationships indicated do not quite give the picture since the big evergreens from out of the ancient lands of the Asiatic mainland are of a parental stock which dates its royal lineage from earliest antiquity, of which the Japanese forms themselves are but descendants.

Next in consideration come the "Comely Cedars", then "Abies of the Snows." At this point may we be allowed to say that the autobiography of Mr. Abies as told by himself was totally unnecessary? Why dress up an interesting account like a bed-time story? The same may be said for Messrs (or perhaps the Misses) Radiata and Macrocarpa (surname Pinus), picturesquely designated by the author as "Orphans of Sea and Sun." In order come the cypresses, cedars, firs, and hemlocks, old reliables who defy time; the interesting trees and forests of the Old World; and then—would you believe it?—the "Proficuous Miss Taxifolia." The chapter on the spruces tells of the paper-making industry which depends on these trees—a very interesting story; and then follow all of the pines, among which apparently there are social class distinctions.

Before concluding I should like to make my feelings clear: that garnishing these grand old trees with a lot of whipped-up sentiment is like trying to make a sissy out of a hundred percent boy. They have a natural appeal to which nothing we can say will add a jot, and they speak for themselves, but not audibly. Why spoil them?

On the other hand, we wish to call attention to a very worth-while list of the most famous trees, known on page 68 as "The Evergreen Grove of Fame." Facts and figures about the fourteen most famous big trees of the world are here brought together.

Finally, we wish most heartily to support the author in his appeal to the public set forth in the final chapter. He begs us to employ all means to prevent forest fires and in so doing help to preserve our forests and our big trees.

W. M. PORTERFIELD.

Brief Notes on Varied Books

Country Living

EDEN ON A COUNTRY HILL. Ruth Cross. 244 pages. Illustrated. H. C. Kinsey Co, New York, 1938. $2.

The day-by-day experiences of those many city folk who seem to be making a mass move to the country seldom fail to appeal to those who still remain among the tall buildings. Mrs. Cross's story is a highly personalized tale of the desire for and acquisition and development of a place in the country. With the narrative are ideas which others may wish to follow when they too purchase an old New England farm.

For Children

ADVENTURES IN GARDENING FOR BOYS AND GIRLS. M. G. Kains. 280 pages, indexed and illustrated. Garden City Publishing Co., New York, 1938. $1.

Grownups have long been following Mr. Kains' sound directions for gardening, as given in lectures, books, and countless magazine articles. The children now come into his fold, and he writes for them an entertaining story based on the garden he made for himself every year from the time he was five years old. If "empirical" were not too long a word for the boys and girls, we would like to apply it to the method he advocates for teaching young people how to work in a garden. Instead we will say that he emphasizes trial and error as the best means of understanding the *why* of garden tasks.

The Desert in Pictures

DESERTS. Gayle Pickwell. 174 pages, indexed. 64 full-page illustrations, with frontispiece in color. McGraw-Hill, New York, 1939. $3.50.

Probably half the people who have traveled across the southwestern desert lands have felt an urge to "do a book about the desert." The rippled sands, the vast expanse, unusual plants and animals, lend themselves so readily to a dramatic type of photography and lead to a branch of natural history which appears unique.

Gayle Pickwell has done the book, and the 64 large photographs and six brief chapters of text offer all that the enthusiastic traveler in America could wish for.

The book would make an appropriate souvenir for anyone who from a train window, an airplane, or an automobile has ever gazed entranced across the desert.

CAROL H. WOODWARD

Current Literature At a Glance*

By Virgene Kavanagh

Lightning. Report of a study of lightning injury to American elms is given in the June number of the *Arborist's News*. The damage was traced from the trunk to the very tip of a large tree, and photomicrographs show that the wood is injured in such a way as to give ready entrance to disease-producing fungi.

Walking Trips. Through the auspices of the Hiking Trips Bureau at Ho-ho-kus, N. J., a schedule of "woodland trail walks" for the autumn and winter months and up until March 31 has been issued in booklet form. The trips cover much of New Jersey and Connecticut and adjacent sections of New York.

Garden Book. The "Northern Garden," by Daisy T. Abbott of Minnesota is a valuable little book for amateur gardeners, beginners or not, discussing what to do about the garden each week in the year, what to plant, where to plant it, how to care for it, when to transplant, how and when to spray and numerous other bits of information.

Wild Flowers. Among the recent publications on wild flowers are "Wild Flowers of North Dakota" by E. J. Haserlund, Circular 164, North Dakota Experiment Station, Fargo, illustrated and non-technical; "The Flowering Plants and Ferns of Mount Ranier" by George Neville Jones, University of Washington, Seattle, illustrated and technical with a key; "Wild Flowers of Missouri" by Theresa C. Rickett, Agricultural Extension Service, University of Missouri, Columbia, illustrated and non-technical but with a key; and "Pleasure with Plants" by L. R. Tehon, Illinois Natural History Survey, Urbana, Circular 32, a guide for plant collection and preservation.

Mosses. Dr. A. J. Grout has completed Volume 1 of his "Moss Flora of North America" with Part 4 on the Pottiaceae.

For Gardeners. The July number of *House and Garden* is devoted chiefly to gardening and has articles on lilies, tulips, daffodils, roses, trees and shrubs, window plants, and lawns.

Teaching. "Achievement Tests in Relation to Teaching Objectives in General College Botany," issued by the Committee on the Teaching of Botany in American Colleges and Universities of the Botanical Society of America as Bulletin No. 120, will prove stimulating reading to anyone interested in the teaching of botany and deserves extensive consideration by educators not necessarily interested in botany.

Compost. In the *Digest* of the Radio Garden Club address of Sept. 1 over WOR, Richard Walter, Supervisor of Parks at Maplewood, N. J., gives complete directions for the making of a successful compost heap from leaves by a method which has been worked out by the Maplewood Park Department. The yearly growth of evergreens nearly doubled after use of the coarser part of the compost as a mulch, he reports, and many herbaceous plants have shown definite improvement with the compost incorporated into the soil. The *Digest* is obtainable free from the Radio Garden Club of the New Jersey College of Agriculture, New Brunswick, N. J.

Park Survey. *The Regional Review*, issued monthly at Richmond, Virginia, by the National Park Service expresses the need for a summary of the existing national parks throughout the world and the progress being made in their development. "There does not exist even an up-to-date skeletal directory of the world's preserves," the magazine reports; "certainly there is no comprehensive work that assembles authoritative materials relating to their geologic, biologic, scenic and historic features, to the origins of their sponsorship, to the methods by which they were established, and to the directive machinery by which they are maintained as national trusts and safeguarded against destruction or exploitation. . . Altogether, the task should be inviting to some fearless researcher favored with ample leisure, tireless eyes and strong constitution."

* All publications mentioned here and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

Notes, News, and Comment

Visitors. Eric Walther, Botanist of Golden Gate Park, San Francisco, paid several visits to the Botanical Garden during the fall. While here he checked over the succulent collection, notably species of *Echeveria* for their nomenclature.

Dr. William H. Schopfer of Bern was a visitor at the Botanical Garden in early September. He was scheduled to give a paper in French at the Microbiological Congress in New York that week, but upon the outbreak of the war he was called back to Switzerland as a reserve officer, before the address could take place.

Among other visitors at the Garden in September were Franklin T. Metcalf of Lingnan University, Canton, China; Louis C. Wheeler, University of Missouri; Lulu O. Gaiser, McMaster University; Eric O. Callen, Royal Botanic Garden, Edinburgh; H. G. Crabtree, Imperial Cancer Research Fund, London; W. J. Purdy, National Institute for Medical Research, Hampstead, London; Frederick A. Wolf, Durham, N. C.; A. LeRoy Andrews, Ithaca, N. Y.; Otto Laporte and James Merry, University of Michigan; Ray Bentall, University of Tennessee; Gregorio T. Velasquez, Field Museum, Chicago; Maxine M. Larisey, Wellesley College; Fernand Chodat, Geneva; Kung Hsiang Liu, Cornell University; R. T. Clausen, Cornell University; Ruth V. Schmitt, Whitnall Arboretum, Hales Corners, Wisc.; and E. M. Becton, McKee Jungle Gardens, Vero Beach, Florida.

Student Gardener Activities. The international situation has brought back to New York Samuel Bridge, who had been in England since July as exchange student gardener at Kew. J. W. E. Stott, who arrived from Kew on July 3 for a year on exchange, is scheduled to return to England Oct. 14 on the *Manhattan*.

Wilbur Wright, student gardener who had been employed at the Botanical Garden for a year and a half, left Sept. 30 to enter Cornell University.

Charles F. Guntner, who was employed as an apprentice gardener for a year in 1936 and 1937, has received an appointment as assistant propagator at Princeton University, under the direction of James Clark, Superintendent of Grounds. Since his work at the Botanical Garden he has attended Cornell and also been employed by "Gardens on Parade" at the World's Fair.

Bequest. Miss Virginia Scott Hoyt, who died at her home in New York Dec. 27, left a bequest of $2,500 to The New York Botanical Garden. The sum will be added to the endowment.

J. A. Manda. The orchid-grower of Llewellyn Park, West Orange, N. J., Joseph A. Manda, died at his home Sept. 23 at the age of 65. Though he had retired eight years ago from the business which bears his name, he had remained actively interested in orchid culture. He was reputed to be the first in this country to raise *Cypripedium* from seed, and he was the creator of many orchid hybrids which are on the market today. For many years he had made it his practice to visit The New York Botanical Garden on his birthday, always bringing gifts of orchids with him. Many of the rare species now in the Garden's collection were presented by Mr. Manda.

Return. Dr. A. B. Stout returned to New York on schedule Sept. 19 after a summer spent abroad. The entire trip took place as planned, except for the last ten days in the British Isles, after the war broke out, when the lecture which he was scheduled to give before the Royal Horticultural Society in London was canceled by the Society.

Myxomycetes. A unique reference collection of Myxomycetes from The New York Botanical Garden, prepared by Robert Hagelstein, traveled this summer in far northwestern Canada on an expedition sponsored by the Arnold Arboretum. Lucy C. Raup, who accompanied her husband, Dr. Hugh M. Raup, used the set in the field when collecting Myxomycetes, which have almost never before been gathered from northern Canada. The reference set consists of 150 species numbered and fastened inside of a small handkerchief box, with the names and numbers written inside the cover. This is the eighth of a series of expeditions conducted in the Mackenzie Basin by Dr. and Mrs. Raup since 1926. It is their hope that the accumulated material will contribute to the major problems of plant distribution in arctic and subarctic America. The trip was made by airplane, railroad, steamer, canal, and on foot.

Microbiologists Meet In New York For International Congress

Fifteen hundred scientists, including two hundred from forty different countries, assembled in New York during the first week of September to attend the Third International Congress for Microbiology at the Waldorf-Astoria Hotel. The largest number of foreigners came from England.

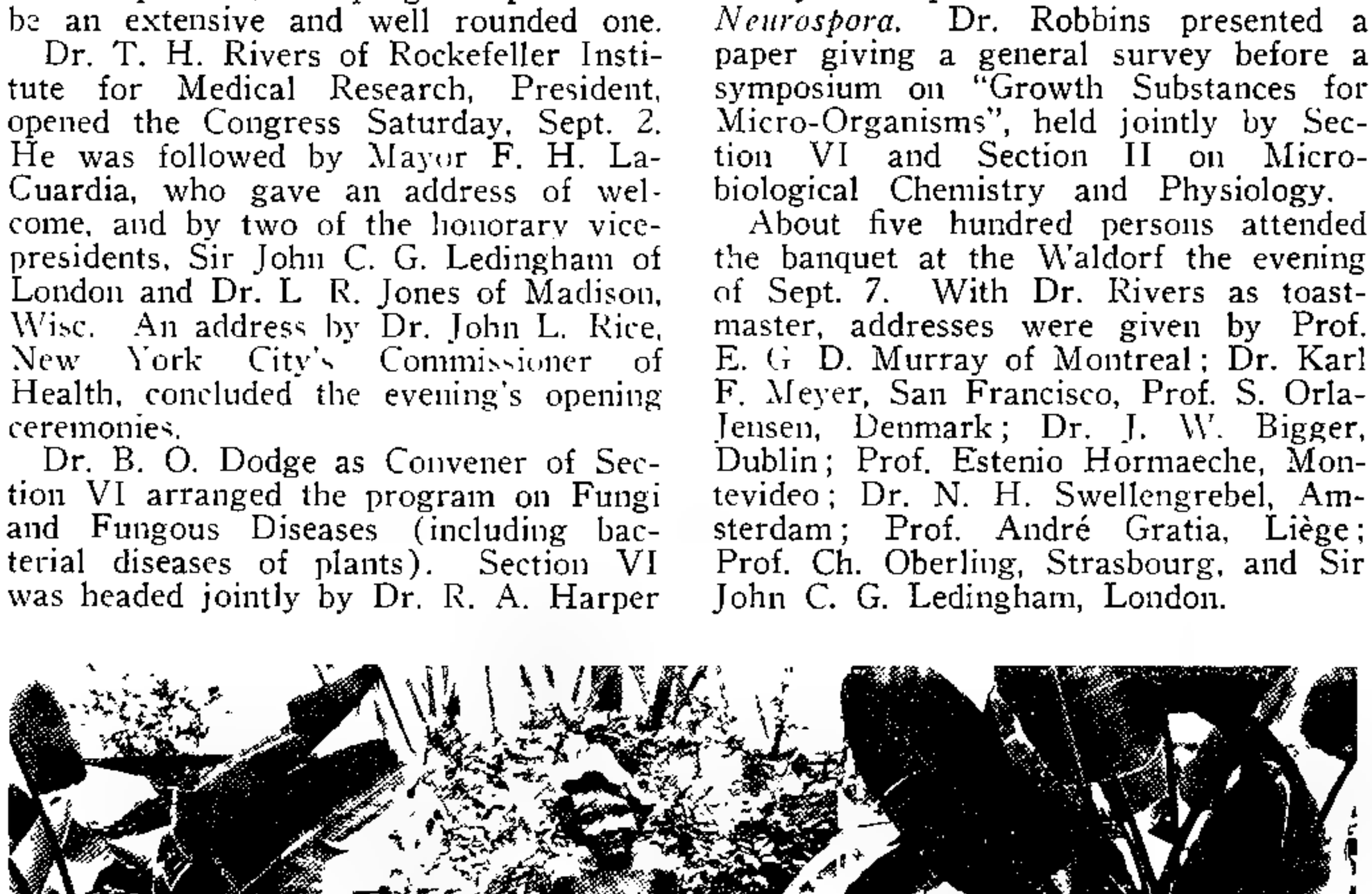
Even with many papers omitted because of the inability of delegates to leave their countries during a time of international upheaval, the program proved to be an extensive and well rounded one.

Dr. T. H. Rivers of Rockefeller Institute for Medical Research, President, opened the Congress Saturday, Sept. 2. He was followed by Mayor F. H. LaGuardia, who gave an address of welcome, and by two of the honorary vice-presidents, Sir John C. G. Ledingham of London and Dr. L R. Jones of Madison, Wisc. An address by Dr. John L. Rice, New York City's Commissioner of Health, concluded the evening's opening ceremonies.

Dr. B. O. Dodge as Convener of Section VI arranged the program on Fungi and Fungous Diseases (including bacterial diseases of plants). Section VI was headed jointly by Dr. R. A. Harper of Columbia and Dr. F. A. Weidman of the University of Pennsylvania Medical College, who presided. Dr. William J. Robbins was one of the vice-presidents of the section. The committee of Section VI included Dr. Fred J. Seaver, Dr. Robbins, Dr. Weidman, Dr. Rhoda Benham, Dr. Michael Levine, Dr. George M. Lewis, and Dr. H. M. Fitzpatrick. Dr. J. S. Karling was recorder and Dr. J. Gardner Hopkins, secretary.

Dr. Dodge addressed a general session of the Congress Sept. 6 on "Some Problems in the Genetics of the Fungi," using chiefly examples from his studies of *Neurospora.* Dr. Robbins presented a paper giving a general survey before a symposium on "Growth Substances for Micro-Organisms", held jointly by Section VI and Section II on Microbiological Chemistry and Physiology.

About five hundred persons attended the banquet at the Waldorf the evening of Sept. 7. With Dr. Rivers as toastmaster, addresses were given by Prof. E. G D. Murray of Montreal; Dr. Karl F. Meyer, San Francisco, Prof. S. Orla-Jensen, Denmark; Dr. J. W. Bigger, Dublin; Prof. Estenio Hormaeche, Montevideo; Dr. N. H. Swellengrebel, Amsterdam; Prof. André Gratia, Liège; Prof. Ch. Oberling, Strasbourg, and Sir John C. G. Ledingham, London.



A scene in the new Tropical Flower Garden in the main conservatories at The New York Botanical Garden. Members will soon receive cards announcing the opening of this house.

THE NEW YORK BOTANICAL GARDEN

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A. C. PFANDER ..... *Assistant Superintendent*

MEMBERSHIP IN THE GARDEN

Established as a privately endowed institution, aided partially by City appropriations, The New York Botanical Garden is dependent for its progress largely upon benefactions and memberships. Through these means, though young as botanical gardens go, it has become the third largest institution of its kind, its library, herbarium, and horticultural collections ranking among the finest and most complete in any country.

Membership in The New York Botanical Garden, therefore, means promotion of scientific research in botany and the advancement of horticultural interests. Scientifically, the Garden is able to serve as a clearing-house of information for students and botanists all over the world; horticulturally, it often serves as a link between the plant explorer or breeder and the gardening public.

Through memberships and benefactions, provision is made at the Botanical Garden for the training of young scientists and student gardeners; hundreds of new books are added annually to the library, which is open daily to the public for research and reading; free exhibits are maintained in the museum, the greenhouses, and gardens, and lectures, courses, and free information in botany and gardening are given to the public.

Each individual member of the Garden receives:

(1) A copy of the Journal every month.

(2) A copy of Addisonia once a year, each number illustrated with eight colored plates of unusual plants, accompanied by complete descriptions and other pertinent information.

(3) A share of surplus plant material of interesting or new varieties whenever it is distributed.

(4) Announcements of special floral displays at the Garden from season to season.

(5) Credit, to the extent of the membership fee paid, toward courses of study offered by the Garden.

A limited number of garden clubs are accepted as affiliates. The privileges of affiliation are a subscription to the Journal, announcements of displays, a specially conducted tour of the grounds and greenhouses, and a lecture once a year by a selected member of the staff.

Fellowships or scholarships for practical student-training in horticulture or for botanical research may be established by bequest or other benefaction either in perpetuity or for a definite period.

The classes of membership and types of benefaction are as follows:

Annual Member	annual fee	$ 10
Sustaining Member	annual fee	25
Garden Club Affiliation	annual fee for club	25
Fellowship Member	annual fee	100
Member for Life	single contribution	250
Fellow for Life	single contribution	1,000
Patron	single contribution	5,000
Benefactor	single contribution	25,000

Contributions to the Garden may be deducted from taxable incomes. The following is a legally approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

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CAROL H. WOODWARD, Editor

November, 1939

SCENE IN THE NEW TROPICAL FLOWER GARDEN
Cover Photograph by Fleda Griffith

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L A B E L I N G

Someone has said that a museum is a collection of labels illustrated by exhibits. These words might also be applied to the great collection of living plants at The New York Botanical Garden, which is a museum of living exhibits.

Plants brought together for esthetic value alone obviously need no labels; but to lend educational value to displays, labels are necessary, not only to answer the fundamental question of the name of each plant, but also to convey additional information about it, especially its geographic origin, uses, or cultivation.

To make the labels unobtrusive, yet legible and informative, the Botanical Garden uses several different types. One, made of ground glass suspended by slender wire, carries a general account of a group of plants or entire house, such as the cactus collection. Other large labels, such as those in the economic houses and outdoors on the dahlias and roses, are painted on wood. Metal labels of zinc or lead are often attached to tree-trunks.

For the thousands of plants being grown in our propagating houses, much smaller labels of wood or zinc are used to show the name of the plant and, for Garden records, the accession number and source.

It is no small task to prepare the several thousand labels that must be made every year. Each one requires accurate, often involved work, in ascertaining the true identification of the specimen, for always the name used must be the one accepted in botanical literature.

When there is doubt about the proper name for a plant, the flowers are examined, compared with others in the herbarium, and checked in the library with published descriptions. It may be necessary to correspond with distant botanists and borrow herbarium specimens from other institutions before the plant can be positively identified.

Any museum exhibit has value only as names are applied to the objects shown and information about them is given. A label seems an insignificant part of a plant display, yet its character, the information which it bears, and even the making of it involve more judgment, technical information, and labor than the people realize.

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of
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VOL. XL NOVEMBER, 1939 No. 479

The Modern Role Of Ancient Herbs In Industry and Home

By Rosetta E. Clarkson
Editor of the Herb Journal

TODAY in a spacious office in Wall Street six bottles stand on a rack, and in those crystal containers are samples of the six products that have most profoundly affected the world of commerce. One is a jar of little berries, just a handful of pepper, one of the spices to which history attributes the beginnings of world trade.* It holds a place of honor from which, because of its past, it can never be dislodged. America itself owes its discovery to the search for just such aromatic herbs.

We moderns are amazed at the dependence of early peoples on herbs in every phase of their existence. Yet with all our science and invention, we base many of our activities still on these same ancient plants. We grow in the garden a large proportion of what was once food and medicine, of plants that brought health and created industry. Most of the subjects in our flower border . . iris, rose, larkspur, calendula, peony, foxglove, and hundreds more . . are the crude drugs of commerce, the foundation of today's huge botanical drug industry. They are medicinal herbs, long since set apart for their beauty, but for thousands of years grown as crops for the relief of the ailments of man, as they still are grown today in some sections of the world.

Then there are the thymes, the mints, the lavenders, artemisias, the basils . . a multitude of friendly little plants grown the world over for fragrance and for culinary purposes. These too are herbs and the basis of enormous industries dealing with soaps, perfumes, gargles, lotions, extracts, chewing gums, and a multiude of liquors and liqueurs and other products which require flavoring.

There are the herbs of the field . . . boneset, tansy, dandelion, milkweed . . . and the savory seeds such as anise, cumin, coriander, mustard, sesame,

* Imports of pepper in the United States in recent times have totaled 33,000,000 pounds of unground black and nearly 5,000,000 pounds of white a year.

NOV 29 1939

caraway and dill. These are herbs, some medicinal, some culinary, all with innumerable technical and industrial uses as well and some forming the basis for a world-wide trade in spices and condiments. Lastly, there are the ancient herbs we now call vegetables* . carrots, onions, parsnips, spinach, beans and beets, now raised on huge farms for food and industry. Little did the Anglo-Saxons, gathering at times the root of beet to cure the bitings of mad dogs, know that this "wort," as Apuleius calls it, would become the basis for an important branch of the sugar industry. It is hard to realize that as late as Elizabethan times, Gerard was timidly suggesting that the roots of beets, as well as the leaves then used in salads, might possibly prove good wholesome food.

No chart of small proportions can more than suggest how these various divisions of our modern industries, professions, and sciences arose. They form a sort of family tree with roots in the dim past and the branches beginning when the discovery of printing made the knowledge of the herbalists available to all who could read. It helps to show how the gardener, the farmer, and the botanist are one with the doctor, the druggist, the brewer and the cook. It is symbolic that the story of the Bible begins and ends in a garden. The garden and the herbs grown there loom large in all recorded history.

From the Chinese Herbal of Ching-Nong we learn, among other herbs, of ephedra, which was used in Asia 5,000 years ago and is used again today in this country in sinus troubles; we read of rhubarb, also of sesame seeds, the first oil seeds, which are now used by bakers and candy-makers, and in a multitude of industries aside from food. The black of the finest Chinese drawing ink, for instance, comes from burnt sesame; thus herbs enter into the drafting rooms of every factory as well as into the studios of artists and illustrators and thence to magazines, newspapers, and books.

The very existence of the cosmetic, distilling, brewing, perfumery, and tobacco industries is due to herbs. Also based on herbs are many of our food industries and much of farming and husbandry. Surgery, medicine, botany, household science, part of chemistry, can be credited to the study of herbs for more than 7,000 years. Before the printing process was invented, the findings were laboriously entered on parchment manuscripts, copied one at a time over a period of years, and kept in the possession of a few scholars and in monasteries. Many of these manuscripts still exist. Some were reproduced among the first of printed books. Then, as the process of printing became known, new authors appeared. In Elizabethan years some of them wrote of the garden, taking over the description and culture of plants from the herbalists. At about the same

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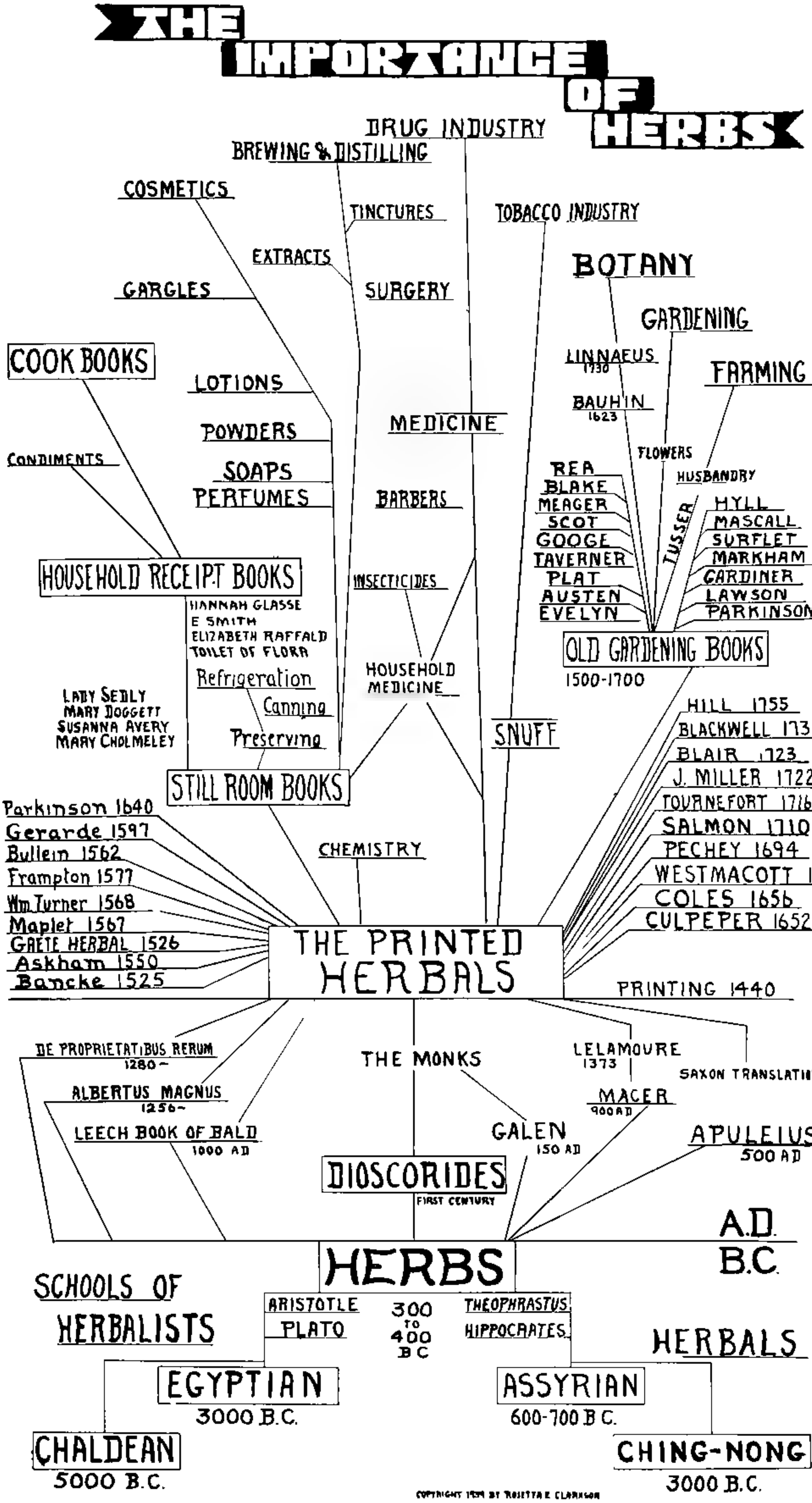
* The word vegetable, denoting a food, has been in use less than 200 years.

THE IMPORTANCE OF HERBS



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Pomet's "Compleat History of Druggs," of which several editions were printed in London in the middle of the eighteenth century, speaks of tobacco as "Holy Herb" because of its great virtues. Many remedies made of tobacco are suggested, and snuff is mentioned, but only indirectly, because " . . there are so many Sorts." The use of tobacco for smoking is only inferred in Pomet's discussion, though Parkinson in his "Theatrum Botanicum" a century earlier speaks of Sir Walter Raleigh and the kind of tobacco he chose while he was a prisoner in the Tower. The illustration above is from Pomet's book, which was originally written in French.

time the casting off of superstition and the rise of medicine as a profession did away with the popular treatises on the medical uses of herbs. Thus the content of the herbal was gone and after 1700 there appeared no herbal of importance.

The gardening books continued and eventually the science of botany was born in the search for methods of classification and identification. But with the gardening books to direct the culture of plants and the medical profession to prescribe the application of them, there was need for a source book of materials to use—*materia medica*—and the old herbals were adopted for the beginnings of a pharmacopoeia, printed in Latin. Great was the hubbub when Nicholas Culpeper, obtaining a copy, published an English translation with comments of his own. However, the

SESAMVM.

△

Sesame has been used in cooking, medicine, arts, and trade for more thousands of years than books and manuscripts record. The Chinese, it is known, have used it since 5000 B.C. The illustration here was published in 1565 in Matthioli's "Commentarii Dioscoridis," and accompanies a description of the plant and list of its uses. In 1935 the United States imported 146,394,158 pounds of sesame seeds . more than all other drugs, herbs, leaves, and roots together, and also imported 11,088 pounds of sesame oil.

▽

establishment of an approved list of herbs for medicine began the great drug industry. Tobacco, early an ingredient of medicinal snuff, was soon recognized as having a narcotic effect and its use for pleasure, apart from medicine, brought edicts, laws and decrees against its use in smoking; but it persisted as a snuff through the centuries to emerge in the last generation as a giant industry in the New World.

Coincidentally with the decline of the old herbals, a new type of book came into being and it marked the entrance of woman into the role of author. Strangely enough, it too grew out of ancient manuscript books and unconsciously opened up a whole new field for industry. It was to become as powerful an influence in daily life as the herbal had been before it. This was the "still-room book."

IX. *The Preparations.* You may make therefrom, 1. *A Liquid Juice of the Herb.* 2. *A Syrup of the ſame.* 3. *The Seed.* 4. *An Ointment.* 5. *A Pouder of the Leaves and Stalks.* 6. *The whole Leaves.* 7. *A Cataplaſm of the Leaves.* 8. *A Diſtilled Water.* 9. *A Liquor.* 10. *A Decoction of Leaves and Stalks.* 11. *The Aſhes.* 12. *The cut Leaves for Smoaking.*

The Virtues.

X. *The Liquid Juice. Parkinſon* ſays that it is effectual to cure the Dropſy, by taking 4 or 5 Ounces of the *Juice* faſting, which will ſtrongly purge the Body both upwards and downwards. I have had no experience of it, but 'tis very probable that it may cure the Dropſy, if given by a wiſe Hand and in a due Doſe. I ſhould be afraid to give 4 or 5 Ounces at a time, by reaſon of its Violence; but it is a continued uſe of it, beginning with a ſmall quantity, and gradually increaſing it, that muſt determine how much may be ſafely given at a time. *Monardus* ſays it is an *Alexipharmicon* againſt the Stinging or Biting of any Venomous Creature, being immediately applyed to the hurt place.

XI. *The Syrup of the ſame.* It is found by good Experience to expectorate tough Flegm out of the Stomach and Lungs. It kills Worms in the Stomach and Belly, eaſes the Head-ach and Megrim, as alſo the Cholick and Griping pains in the Bowels; tho' for ſome time it may ſeem to cauſe more trouble in them, and diſaffect the Stomach. It is profitable for thoſe who have the Stone or Gravel in

△

Tobacco, once it was introduced from America into Europe, became a popular subject of discussion, especially in herbals. Many medicinal uses were suggested, as can be seen by the few lines reproduced here from the second volume of Salmon's "English Herbal" (London 1711). Under the heading, "A Powder of the Leaves and Stalks" occurs the only reference known to the use of tobacco as snuff solely for medicinal purposes. The author says: "Used as a sternutatory, it opens the Head, and cleanses it of the Recrements of the Brain; Strewed upon old Ulcers, it disposes them to a speedy healing: It also kills Lice in the Head."

▽

From early times there was no question about woman's place being in the home. The business of men was war. There was no industry and little trade. Everything was made on the premises. The lady of the house not only directed the meals but in the "still-room", a place set apart, she distilled oils of the herbs, made medicines, liqueurs, jellies, jams, household preparations, and preserved foods. All this was from formulas and recipes handed down from generation to generation, mother

The photograph on this page shows the opening of Salmon's discussion of tobacco, and gives the various names that were ascribed to it in early days. It is noteworthy that the references to such names as Hyoscyamus and Petum (which later gave us the name Petunia) recall plants of the same family as Nicotiana (tobacco). Modern botany, however, gives a slightly different account of the geographic origins of the plant now in common use, and etymologists assign the word tobacco to an origin in the name of a pipe for inhaling tobacco smoke, used by the natives of the Antilles.

CHAP. DCXCIX.

Of TOBACCO *Engliſh.*

I. *THE Names.* It has no *Arabick* nor *Greek* Name that we know of, being a Plant unknown to the Antients; but our Moderns have called it in Latine *Petum* (which is ſaid to be the proper *Indian* Name) and *Nicotiana*, (from one *Nicot* a *French*-Man, Reſident in *Portugal*, who firſt ſent it to the Queen of *France*, from whence it was alſo called *Herba Regina:*) It was alſo called *Tabacco*, as firſt coming to us from an Iſland of that Name in the *Weſt-Indies*: *Lobel* accounts it a kind of *Hyoſcyamus* or *Henbane*, and therefore called it *Hyoſcyamus Luteus*, and *Hyoſcyamus dubius*, as being a yellow or doubtful kind of *Henbane*. We in Engliſh call it *Tobacco*.

II. *The Kinds.* It is either 1. Engliſh, called *Petum Anglicum*, *Nicotiana Anglica*, Engliſh Tobacco, of which in this Chapter. 2. Or *Petum Indicum*, *Petum Americanum*, *Petum Hiſpanicum*, *Nicotiana Mexicana vel Peruviana*, *Nicotiana Virginiana*, Indian or American Tobacco, of which in the ſecond Book of this Work.

to eldest daughter, in a "still-room book", many preserved unto this day, with changing handwriting, changing methods, notes along the margins, certain favored rules marked with an X, denoting good. Such are books of Lady Sedly, Mary Doggett, Susanna Avery, Mary Cholmeley, and many others not known to fame. Here are the beginnings of many of our modern industries, the formulas for all manner of cosmetics, soaps, perfumes, tinctures, gargles, lotions, powders. Here are the ways to preserve, to can, to drive away flies and moths, to bathe tired eyes, aching feet, a gaping wound, a complete compendium for daily living.

These were the manuscripts from which came the printed "household receipt" books which only a generation or two ago were common in every home and from which all cook books stem. From them, too, come our beauty preparations which today we buy in the drugstore, still made with herbs by the old formulas familiar to Elizabethan ladies. Furniture oil still has the scent of lemon balm, as their books advise; thymol is

still the oil in bronchitis remedies; the root of alkanet still gives us its red coloring matter with which court ladies dyed their lips and gave to the plant its symbolism of deceit. It is widely used to stain rosewood and mahogany and to color spurious port wine.

Our dentifrices today, as then, are flavored with anise, peppermint, sage, caraway and thyme, as are our chewing gums. Our soaps are scented with rosemary, lavender, dill and fennel. In any drugstore in the land, you can buy "Hungary water", a lotion scented with rosemary, first made in the 14th century by the Countess of Hainault and the recipe sent to her daughter, the wife of Edward III. Thus, for more than 600 years this simple toilet water has appealed to women.

Of great age also, and full of herbs, are many of our liqueurs, particularly those which took their names from the monasteries where they originated. Chartreuse, for example, contains tansy and angelica; benedictine is amazingly herby with tips of hyssop, cardamom seeds, angelica, peppermint, thyme and arnica flowers. Anise is the basis of anisette, wormwood of absinthe, caraway of kümmel, peppermint of many liquors. Angelica stalks are used as an adulterant of juniper berries in real gin and the seeds are used in muscatel and in vermouth. Clary sage, the oil of which is the best fixative for blending fine perfumes, is infused with elder flowers and added to Rhenish wines to convert them into muscatel wines.

Innumerable are the perfumes in which herbs give the fragrance . . . basil in "mignonette" and in "jonquil"; celery seed in the perfume called "sweet pea"; coriander in "lily" perfume and, with cumin, furnishing the flavoring for the American "hot dog" as well!

Lastly, the true art of cookery, so little practised now-a-days, depends upon the use of ancient herbs, for with modern refrigeration we no longer need the oriental spices to mummify our food or hide the flavor of decay. The country people still know the savour of home grown sage and marjoram, of fennel, mint and parsley, of savory and thyme. Salad lovers call more lustily than ever for chervil and for tarragon . . . French tarragon, that amazing plant that has spread throughout the world by root division, no seeds being available, although the Russian tarragon, which grows from seed, is often foisted on an unsuspecting purchaser. The pickle maker knows the value of the ancient dill and mustard for his products. They are as universally used throughout the industry as sage in sausage, tarragon and burnet in vinegar, cumin and coriander in frankfurters, caraway and poppy seeds in breads and rolls.

Beverages, liqueurs, breads and snuffs; tobaccos, fixatives and dyes; polishes, tinctures, extracts and lotions; insecticides, medicines, sugar and drawing ink . . . there is no end to the importance of ancient herbs in modern industry and home.

Tropical Flower Garden Opened With Ceremony and Tea In Conservatory

IN a ceremony which was attended by more than 150 members and guests of The New York Botanical Garden, the new Tropical Flower Garden, in House 13 of the Main Conservatories, was formally opened the afternoon of Nov. 3. Curtains shielding the house from view were drawn aside by Mrs. Elon Huntington Hooker, President of the Advisory Council, after a brief address in which she urged closer acquaintanceship with the ornamental plantings at the Botanical Garden, because, she emphasized, appreciation becomes keener with familiarity.

Col. Robert H. Montgomery of Cos Cob, Conn., and Coconut Grove, Florida, a member of the Board of Managers of the Botanical Garden, also advocated that the people of New York visit the Garden's conservatories, and suggested that the hobby of plant study would add years to their lives. Declaring that today he was 15 years younger than when he first began the study of plants 15 years ago, he opened his address by saying:

In these highly emotional days we need distractions which are novel enough to arouse new interests in us. If those who have had no hobbies to fall back on would take up the study of certain families or species of trees or flowers or plants it would add 10 years to their lives. We can't avoid, nor should we avoid, participation in national and international affairs, but too much nerve-racking and unfruitful speculation over what may happen will shorten our lives.

I wish everyone in the New York area who loves or even likes trees and flowers and plants would take a chance and pay one visit to our tropical houses. Those who have not stood under a palm tree have missed a thrill which can be had in no other way. Those who have not seen tropical flowers in bloom in adequate settings likewise have missed a thrill which cannot be described. It is not necessary to go thousands of miles to know the tropics. I find here in our own Garden flowers which I have never seen in their native countries. Tourists usually miss the best things the tropics have to offer.

I suggest that everyone in the New York area pay a trial visit to our tropical houses and I know that all will be repaid. Those who become specially interested are cordially invited to become members and thus obtain the advantages of many privileges which I know will add pleasure and profit and sweet relief in these troublesome times.

Reviewing the history of Range No. 1, which was first opened to the public in 1901 and is now commonly known as the Main Conservatories, Col. Montgomery continued:

The Conservatory of The New York Botanical Garden was originally built in 1898. It was reconstructed by the City in 1938 and is being replanted as rapidly as the funds and labor available to The New York Botanical Garden permit. The Conservatory consists of 15 houses, including a palm house which is 90 feet from the floor to the highest point of the roof. Nine of the 15 houses, or units, of the Conservatory have now been completed and the tenth will be opened to the public today. Those previously completed include three succulent houses, a begonia house, a house

for winter flower shows, one representing a tropical rain forest, and houses of ferns and of aroids. It is expected that the other units will be completed before the end of another year. The Conservatory of The New York Botanical Garden is the most extensive range of greenhouses open to the public in New York City.

The New Style of Planting

Then he called attention to the style of planting, in contrast to the plan of former years. He said:

In the past, the Conservatories of the Botanical Garden were primarily concerned with exhibiting as many kinds of plants as possible. These were usually arranged in pots and tubs with little reference to the impression made by the collections as a whole. In so far as practical, the plants in the Conservatories of The New York Botanical Garden are now arranged in naturalistic fashion so that each house presents a picture, not merely a collection of plants. This plan benefits the plants and increases the attractiveness of the houses without distracting from their botanical significance. It is in line with the general but comparatively recent tendency of museums to arrange their materials in a natural setting for the benefit not only of the scientific public but for those also whose interest is more general. In accordance with this general principle the Garden has for some years conducted a continuous flower show from November to May in one portion of the Conservatory. Here again, the flowers are displayed in a garden setting which has proved to be a popular feature of the Conservatory, attracting thousands of visitors during the winter months when the outdoor plantings are not in flower.

In conclusion he mentioned the bronze statue entitled "Wildflower," by Edward Berge, which has been lent to the Garden by the Grand Central Art Galleries, and, speaking further of the new planting in the conservatories, said, "To those who are familiar with northern gardens only, a tropical garden will prove a revelation, and to those who are familiar with tropical gardens, we hope this garden will be a reminder of pleasant days spent in a milder clime."

Mr. Jennings' Address

As a representative of the Park Department of the City of New York, Allyn R. Jennings, General Superintendent, was to have spoken, but was unable to come, so asked that Dr. Robbins read his address, which follows:

January of this year marked the fortieth anniversary of the ground-breaking for the Conservatory group in which we are now engaged in opening a reconstructed section.

"These great glass houses are, without doubt, the most elegant buildings of their kind in the world and also the largest." This is not my own artistic appreciation. It is quoted from No. 6, Volume 1, of the Journal of The New York Botanical Garden. When one looks back to the forty years of service that these houses have given to the lay public and to the botanist, it is a source of great satisfaction to the present park generation that the ground was originally broken by the Commissioner of Parks of the Bronx.

The Park Department has been the landlord and the Botanical Garden the tenant for more than these forty years. This relationship has always been most pleasant and, during the last few years, the spirit of co-operation that the Botanical Garden has evidenced in relinquishing for the general recreational use of the public a considerable portion of their grounds is deeply appreciated.

When another forty years have passed, we hope that this old glass-house will still be standing and providing genuine educational value to New York's citizens and

that the rest of the Garden will have achieved its present objective of becoming the finest botanical garden in the world.

As long as it keeps on providing genuine service to New York's millions, we wish it every success and will continue to help it just as we have in recently having accomplished the major part of the present reconstruction of this conservatory.

In his introductory address, Dr. William J. Robbins, Director, spoke of the opening of the new Tropical Flower Garden as the result of a great co-operative enterprise. "The development of a display such as you will see," he said, "involves many people and represents in a definite and concrete way the co-operation of numerous persons and agencies."

Those Who Worked Together

Within the Garden Mr. Montagne, Dr. Gleason, and Mr. Corbett were intimately associated with the arrangements which resulted in the recent reconstruction of the Conservatory. Mr. Everett and his assistants, especially Mr. Connolly, planned and installed the plantings. Mr. Pfander is mainly responsible for the rock work. Dr. Gleason and his associates, especially Mr. Alexander, are responsible for checking the labels on the plants.

The unit was reconstructed by Lord & Burnham, and I take pleasure in acknowledging the considerate and able way in which they carried out their work under difficult and at times trying circumstances. Especial credit is due Mr. Boden, President of Lord & Burnham, Mr. James Monro, Superintendent of Construction, and Mr Walter Elder.

Lastly, may I say that the reconstruction of the range was the result of the co-operation of the Board of Managers of The New York Botanical Garden and the City of New York through the Park Department. Without the sympathetic, aggressive, and understanding assistance of Mr. Edward King, Co-ordinator of Museums, and Mr. Jackson of the Park Department, this work could never have been brought to fruition. The New York Botanical Garden, as is true for other similar institutions in this City, is a fine example of the mutual co-operation of public-spirited private citizens and city officials. Illustrating this association we have present here today Mrs. Hooker and Col. Robert Montgomery representing the Board of Managers of The New York Botanical Garden, and Mr. Allyn Jennings, General Superintendent of the Park Department.

Dr. Robbins spoke also of the change to be expected in the appearance of the conservatory groups from month to month. "In offering this garden for your inspection and, I hope, your approval, may I emphasize that it is not a static affair which will remain as it is now," he said. "Plants grow and change, and we add to their number and change their arrangement. The Tropical Garden, like the others which I hope you will see after the exercises are over, change from month to month and will be different a month or two months from now. I call this obvious fact to your attention for two reasons: first because I hope I may thus encourage you to come back frequently to see our displays, and second because I wish you to realize that the Tropical Flower Garden is newly planted and has not yet had time to reach its full development."

Dr. Robbins called particular attention to the Christmas and Easter floral displays in House 4, the Floral Display House, but emphasized that on any day from November through May, there is an attractive garden arrangement of flowering plants worth visiting there. He mentioned also

the educational value of such displays, as well as the pleasure they give to those who view them.

After the ceremonies, the Advisory Council served tea at the edge of the Tropical Flower Garden, while the members and guests inspected other units of the conservatories. They visited especially the Tropical Rain Forest, where they were able to see some of the same types of plants as were shown in the Tropical Flower Garden growing in a naturalistic environment, and the Floral Display House, filled with the first of the season's indoor chrysanthemums arranged as in a garden. The day marked the opening of the indoor floral displays for the season, as well as the opening of the Tropical Flower Garden.

Two Begonia Names Clarified

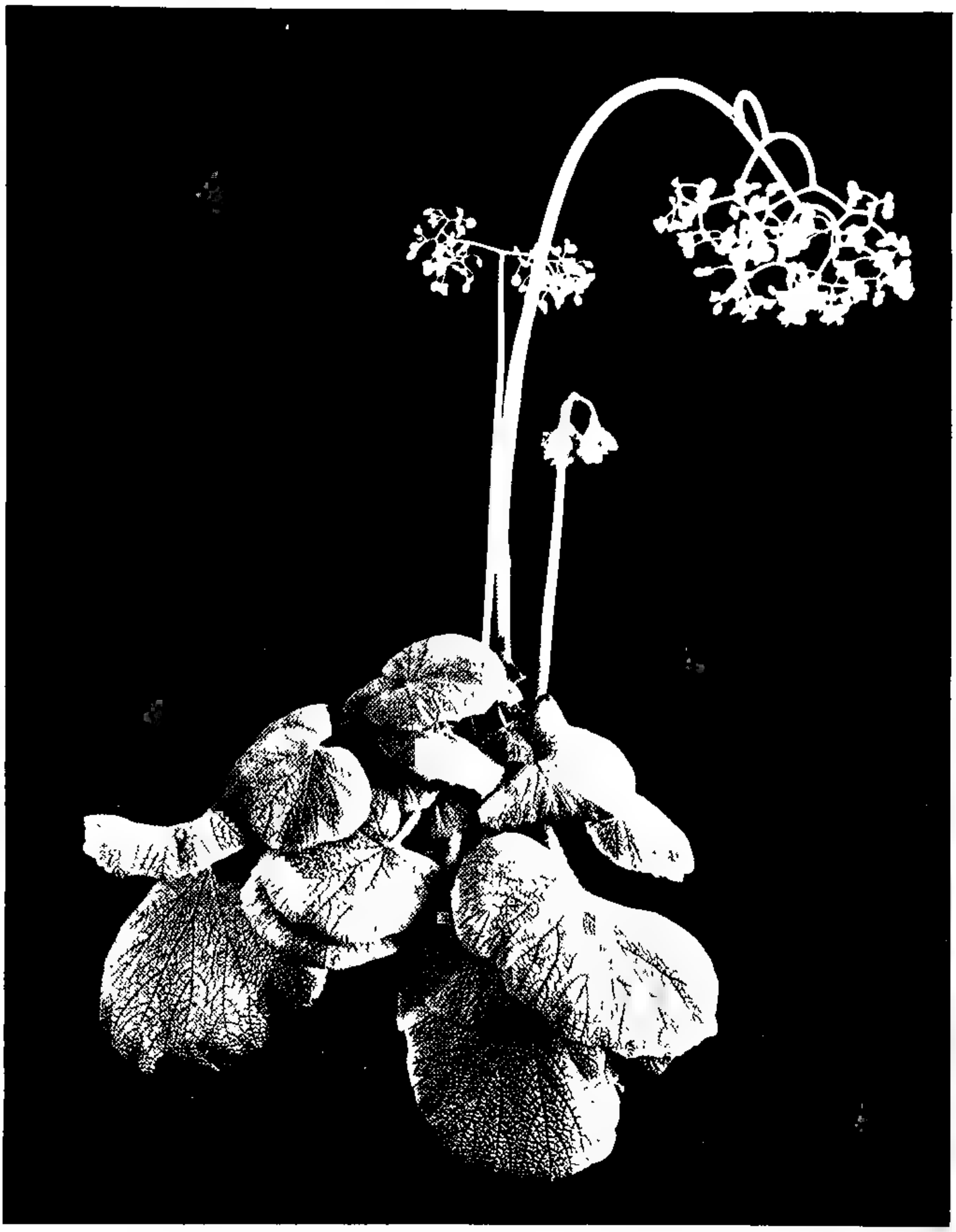
By T. H. Everett

Begonia acida

A BEGONIA of distinctive appearance which has been cultivated for many years in American gardens as *Begonia brasiliensis* and sometimes as *B. ecuadoriensis* is clearly wrongly labeled under either designation for the trivial name *brasiliensis* belongs rightly to a slender, upright-growing, pink-flowered plant first described by Klotzsch in 1854, while the binomial *B. ecuadoriensis* has no good botanical standing.

The plant commonly grown as *B. brasiliensis* is actually *Begonia acida,* a native of Brazil and originally described by De Candolle in 1864. In cultivation this species enjoys a higher temperature than do most begonias and seems to thrive best under greenhouse conditions when accorded a night temperature of 60 to 65 degrees.

Begonia acida has more or less creeping rhizomes and bright green, conspicuously rugose leaves which are nearly orbicular, and measure to nine inches in diameter. The upper leaf surface is furnished with short bristly hairs, and on the under surface the leaves, like the fleshy petioles, are densely covered with thick white or pink hairs which are often laciniate. From December to April the inflorescences are borne, the flowers being carried high above the foliage on peduncles which are two feet or more long. In the bud stage the inflorescences are nodding, but they become upright as they mature. The flowers are about 5/8 of an inch in diameter, creamy-white or sometimes faintly pink-tinged, the males four-petaled and the females five-petaled. The ovary wings are white, and one of them is egg-shaped and very much larger than the other two. Except for the fact that the hairs on the rhizomes are depicted in a formalized style so that they more resemble divided scales, the illustration of *B. acida* in Vellozo's "Florae Fluminensis" Vol. X plate 49, correctly depicts our plant.



A specimen of Begonia acida grown at The New York Botanical Garden

Begonia xanthina

The publication in *Horticulture* for March 1, 1931, of a note by Mary Gibson Henry referring to a begonia from India identified as *Begonia Cathcarti*, has led to some confusion in begonia-growing circles.

Mrs. Henry says that several years earlier she obtained the seed directly from Sikkim, Bengal, India, "where it is a native." She mentions that the seed germinated readily and then describes her plant as "having beautifully variegated foliage." She says, "It is a dwarf, compact growing plant with clusters of inch-wide butter-yellow flowers with a very slight scarlet shading externally, these held well above the leaves . . the drooping foliage nearly hiding the pan, and the entire height is less than a foot." Continuing, Mrs. Henry states that her plant "resembles the *Rex* type of begonia with rhizomatous stem and a fibrous root system." She says that she sent some of these begonias to the Bureau of Plant Industry of the United States Department of Agriculture, for propagation and distribution.

Plants received at the New York Botanical Garden in 1935 and 1938 from eastern begonia growers are probably of this stock. In any case they agree precisely with the description given, and others raised from seed collected by Captain Kingdon Ward in the same Himalayan region have proved to be identical.

An examination of the literature quickly shows, however, that the plant in question is not *B. Cathcarti,* which differs from our plant in being caulescent, in having solitary flowers which are white to pink in color and are hairy on the outsides of the petals, and in other important features. *B. Cathcarti* is well illustrated in color in Hooker's "Illustrations of Himalayan Plants" (plate 13).

The plant described by Mrs. Henry and now often grown as *B. Cathcarti* is, in fact, one of the forms of *B. xanthina*, a species which inhabits the same general geographical region. This species was first described by Hooker (*Botanical Magazine,* plate 4683) in November, 1852, and a good illustration in color accompanies the original description.

B. xanthina is related to *B. Rex*. It has short, thick, horizontal rhizomes and heart-shaped leaves which are green to purple and variously marked above and red beneath. The petioles and peduncles are hairy as also are the main veins beneath. The inflorescences rise well above the foliage and are many-flowered, the flowers being bright yellow with the petals smooth but tinged red on the reverse. The female flowers are smaller than the males and are characterized by the possession of one ovary wing which is "remarkably elongated horizontally."

In the 1935 supplement to "Hortus" under *B. Cathcarti* there is briefly described the plant introduced by Mrs. Henry under that name, but it is really *B. xanthina*.

Books for the Practical Gardener

Compiled by Elizabeth C. Hall

ACKERMAN, ISABEL and others. **Harmony in Flower Design.** Dodd, Mead, $3.
ADRIANCE, G. W. and BRISON, F. R. **Propagation of Horticultural Plants.** McGraw-Hill, $3.
BAILEY, L. H. **Garden of Larkspurs.** Macmillan, $3.
BAILEY, L. H. **Garden of Pinks.** Macmillan, $3.
BAILEY, L. H. and E. Z., compilers. **Hortus: A Concise Dictionary of Gardening;** new rev. ed. with Supplement. Macmillan, $5.
BAILEY, L. H., ed. **Standard Cyclopedia of Horticulture.** 3 vol. Macmillan, $15.
BIDDLE, DOROTHY and BLOM, DOROTHEA. **Creative Flower Arrangement.** Doubleday, $2.
BISSLAND, J. H. and others. **Rock Gardens and What to Grow in Them.** Hale, Cushman & Flint, $1.
BLACKBURN, BEN. **Your Garden This Week.** Rutgers Univ. Press, $1.
BORG, JOHN. **Cacti: A Gardener's Handbook for Their Identification and Cultivation.** Macmillan, $7.50.
BOWERS, C. G. **Rhododendrons and Azaleas.** Macmillan, $10.
BROWN, J. R. and others. **Succulents for the Amateur.** Abbey Garden Press, $1.50.
BUSH-BROWN, LOUISE and JAMES. **America's Garden Book.** Scribner, $3.50.
BUXTON, BESSIE. **Begonias and How to Grow Them.** Hale, Cushman & Flint, $1.
CLARKSON, R. E. **Magic Gardens: A Modern Chronicle of Herbs and Savory Seeds.** Macmillan, $3.
CLAY, SAMPSON. **Present-day Rock Garden;** being a complementary volume to Farrer's English Rock Garden. Nelson, $12.50.
CLUTE, W. N. **Second Book of Plant Names and Their Meanings.** Clute, $3.
CONNORS, C. H. and TIEDJENS, V. A. **Chemical Gardening for the Amateur.** Wise, $1.95.
CONWAY, J. G. **Flowers: East-west.** Knopf, $6.
COOMBS, S. V. **South African Plants for American Gardens.** Stokes, $4.50.
CRANE, M. B. and LAWRENCE, W. J. C. **Genetics of Garden Plants.** Macmillan, $3.25.
CUMMING, ALEX. **Hardy Chrysanthemums.** McGraw Hill, $2.75.
DEMPSEY, P. W. **A Year in My Garden.** Standard Diary Co., $1.
FARRINGTON, E. I. **Gardener's Almanac.** Hale, Cushman & Flint, $1.
FARRINGTON, E. I. **Gardener's Travel Book.** Hale, Cushman & Flint, $2.50.
FARRINGTON, E. I. **Vegetable Garden.** Hale, Cushman & Flint, $1.
FELT, E. P. **Our Shade Trees.** Orange Judd, $2.
FREE, MONTAGUE. **Gardening: A Complete Guide to Garden Making.** Harcourt-Brace, $2.95.
GREEN, C. H. **Trees of the South.** Univ. of N. C. Press, $2.50.
GREY, C. H. **Hardy Bulbs.** 3 vol. Dutton, $8 per volume.
HASELTON, S. E. **Cacti for the Amateur.** Abbey Garden Press, $1.50.
HAWORTH-BOOTH, MICHAEL. **Flowering Shrub Garden.** Scribner, $5.
HILL, A. G. **Forty Years of Gardening.** Stokes, $4.
KAINS, M. G. and MCQUESTEN, L. M. **Propagation of Plants.** Orange Judd, $3.50.
KEAYS, E. E. **Old Roses.** Macmillan, $3.
LAMB, F. H. **Book of the Broadleaf Trees.** Norton, $3.75.
LATIMER, J. A. **Notes for My Garden.** (Garden Record Book.) Latimer, $1.60; with celluloid index tabs $3.
LAWRENCE, W. J. C. **Practical Plant Breeding.** Allen & Unwin, $2.50.
LEYEL, HILDA. **Herbal Delights.** Houghton Mifflin, $4.
MCKENNY, MARGARET and SEYMOUR, E. L. D. **Your City Garden.** Appleton-Century, $2.50.
MERCER, F. A., ed. **Gardens and Gardening.** Studio, $4.50.
MERRITT, M. G. **Practical Lawn Care.** De La Mare, $.75.
MORSE, H. K. **Gardening in the Shade.** Scribner, $3.

NICOLAS, J. H. **Rose Manual;** revised edition. Doubleday, $2.50.
NICOLAS, J. H. **Rose Odyssey.** Doubleday, $2.50.
ORTLOFF, H. S. and RAYMORE, H. B. **Garden Planning and Building.** McGraw-Hill, $3.
PARKER, C. W. **Lawn.** Hale, Cushman & Flint, $1.
PERRY, FRANCES. **Water Gardening.** Scribner, $5.
QUINN, VERNON. **Stories and Legends of Garden Flowers.** Stokes, $2.50.
ROBERTS, J. L. **Modern Dahlias.** Doubleday, $2.
ROCKWELL, F. F. and GRAYSON, E. C. **Gardening Indoors.** Macmillan, $2.50.
ROHDE, E. S. **Herbs and Herb Gardening.** Macmillan, $3.
ROWNTREE, LESTER. **Flowering Shrubs of California.** Stanford Univ. Press, $3.
SALISBURY, E. J. **The Living Garden.** Macmillan, $3.
SEYMOUR, E. L. D., editor. **Garden Encyclopedia.** Wise, $4.
SLATE, G. L. **Lilies for American Gardens.** Scribner, $3.50.
STORM, KATHERINE and ARTHUR. **The Small Garden.** Stokes, $2.50.
TAYLOR, NORMAN, editor. **Garden Dictionary;** new edition. Houghton, $7.50.
VAN DE BOE, LOUIS. **Planning and Planting Your Own Place.** Macmillan, $4.50.
WEBSTER, H. N. **Herbs.** Hale, Cushman & Flint, $1.
WESTCOTT, CYNTHIA. **The Plant Doctor.** Stokes, $2.00.
WHITE, E. A. **American Orchid Culture.** De La Mare, $5.
WILDER, L. B. **Adventures with Hardy Bulbs.** Macmillan, $5.
WILDER, L. B. **Garden in Color.** Macmillan, $2.95.
WISTER, JOHN. **Four Seasons in Your Garden;** revised edition. Lippincott, $2.95.
WRIGHT, RICHARDSON. **Gardener's Day Book.** Lippincott, $2.50.
WRIGHT, RICHARDSON. **Story of Gardening.** Garden City Pub. Co., $1.79.
WYMAN, DONALD. **Hedges, Screens and Windbreaks.** McGraw Hill, $2.75.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

Plant Life in Perspective For Those Who Like To Browse

THE WORLD OF PLANT LIFE. Clarence J. Hylander. 722 pages, illustrated, indexed; appendices. Macmillan, New York, 1939. $7.50.

For anyone at least somewhat botanically trained and interested in assembling a library of general rather than technical or highly specialized volumes dealing with plants, The World of Plant Life should have appeal. Though basically taxonomic in plan, the taxonomist would bemoan the sacrifice of detail to an attempt at comprehensiveness, while to the "plant lover", wholly untutored in the concepts and significance of classification, the details contained would be meaningless. It is to the intermediate class, therefore, that the book has greatest appeal, to those "who know what it's all about" but who at the same time still like to browse in books and preserve a perspective of the plant world as a whole.

In 636 large pages of text and illustrations the book surveys the entire plant kingdom. In addition to accounts of important species, the introductory remarks of each chapter are especially valuable, and at the end of the volume is a list of 100 other books which alone would constitute a well diversified library on plant life.

It is regrettable that in a book so well written and otherwise beautifully executed, the photographic reproductions which should put an attractive finishing touch to a volume of this nature, are mediocre, to say the least, but the drawings, though diagrammatic in part, are well done, serve their purpose, and are pleasingly reproduced.

E. H. FULLING,
Editor, The Botanical Review.

Henry Correvon's Farewell In a Fourth Edition Of "Flore Alpine"

FLORE ALPINE. Henry Correvon. 173 pages, indexed, illustrated with 80 colored plates. Delachaux & Niestle S.A., Neuchatel et Paris, 1939. 12 francs (Swiss).

When Henry Correvon sent the final proofs of his final book to his publishers in Neuchatel, in May 1939, he called it the "most exact and best documented" of all his works, and added, "I hope that it will be popular." (In 1931 the University of Geneva had given him the honorary degree of Doctor of Science in recognition of his popularization of the study of plants, especially the flora of the Alps.)

The proofs had been spelled out to him by his grandson, Aymon Correvon, for the author was nearly blind when he finished this last work. He was to have an operation in a couple of days in the hope of having his eyesight restored. He started the trip to the oculist in a distant city but the operation never was performed. At the age of 85, Henry Correvon died, the fourth edition of his Flore Alpine just completed.

Since 1885 Correvon had been writing books about plants, mostly in French, but some in English, Italian, Danish, and German. As late as 1938 he was still producing new work: Fleurs des Eaux et des Marais, which was reviewed in this Journal last November. His Flore Alpine first appeared about 30 years ago. It has been enlarged since then, and some chapters have been rewritten, especially in the fourth edition, with the idea of popularization. The book gives the reader a picture not only of the flowers which carpet the slopes of the Alps and cling precariously to precipices, but also of the plant life of other mountain regions of Central Europe. To one who has climbed a few of these mountains both the text and the illustrations recall with a pleasant wistfulness the treasures in flowers found along the trail.

CAROL H. WOODWARD.

Delphinium Manual

THE GARDEN OF LARKSPURS. L. H. Bailey. 116 pages, indexed and illustrated. Macmillan, New York, 1939. $3.

L. H. Bailey's book, The Garden of Larkspurs, is the first book to cover the subject of delphinium adequately from both the botanical and the garden standpoints. The botanical data about the various natural species will be of particular interest and value to breeders and growers everywhere. If a geneticist will now give us as complete a study of the species, the development of new and worth-while types that Dr. Bailey predicts will be more rapidly attained and we may also have an answer to the speculations about the origin of the hybrid strains we grow in our gardens today.

In addition to Dr. Bailey's own lucid notes on the culture of delphinium, there are exhaustive chapters by Dr. Leonian and Dr. Blauvelt covering what is known to date about combatting delphinium diseases and pests.

This book is distinctly a "must have" in the library of everyone interested in growing delphinium.

EDWARD STEICHEN.

Collateral Reading on Flower Structure

INTRODUCTION TO FLORAL MECHANISM. S. G. Jones. Chemical Publishing Co., New York, 1939. xi + 274 pages, frontispiece, 71 figs., 2 pls., 4 tables, 1 chart, bibliography, glossary, index. $4.

Today the flower is often studied as a structural and functional unit, as is shown by the present volume. Its author, however, believes that a knowledge of the principles of cytology and genetics is also necessary to assist "the elementary student" in realizing the importance of these fields in "hybridization and plant breeding." Consequently, suitable chapters concerned with these subjects are included in Part One with the general discussions of the structure and functions of the flower. Part Two, on the other hand, is devoted to the presentation of common or frequently cultivated species of selected families of flowering plants found in Great Britain.

Whereas the material included in Part One does not transgress the elementary level, Part Two offers more than one could find in manuals or even in larger descriptive works, at least as far as the discussions of pollination are concerned.

A noteworthy feature of the book is the inclusion of numerous excellent illustrations, most of which were drawn by the author, who is of the opinion "that the student should see more of the

developmental and anatomical aspect of the subject than is usually supplied in the elementary textbook." Moreover, he is convinced that "even inflorescence schemes and floral diagrams come to have a real meaning if their skeletons can be seen clothed with flesh." This aim is certainly most desirable though it is difficult to see how the beginning student will get their full benefit without first having been taught the fundamentals of plant structure.

While the book is not likely to be adopted as a textbook in many American colleges, it should prove of considerable interest as collateral reading for beginning courses in botany, regardless of their particular character.

THEODOR JUST,
University of Notre Dame.

Explorer in Peru

A FORGOTTEN RIVER. Christopher Sandeman. 299 pages, illustrated with photographs and maps, index. Oxford University Press, 1939. 12 s. 6 d.

In this book of travel notes Mr. Sandeman has given an excellent picture of a portion of Peru infrequently visited by foreigners. The account, the greater part of which is in the form of a diary, describes a trip from Lima to the Huallaga River, the descent of that river by raft, and the return to the Pacific coast through northern Peru. The author's polished style makes his day-by-day story a pleasure to read, and he is especially to be congratulated on the accuracy of his botanical names, a rare feature in popular books of South American travel. Readers acquainted with the works and writings of Spruce, Poeppig, and other botanists will enjoy comparing their descriptions of the same general region with that of the present writer.

The book is frankly not so much a description of Peru as a description of Mr. Sandeman in Peru; this approach has much of the personal touch to recommend it, but, at least to the reviewer, it is less exciting than a more objective one. The reader is perhaps too often reminded that he is being shown a beautiful and distant land through the eyes of a stranger, to whom the "natives" are so many workmen, the rapids so many obstacles, and the plants, alas, so many specimens.

A. C. SMITH.

Genetics for Gardener And Scientist

THE GENETICS OF GARDEN PLANTS. M. B. Crane and W. J. C. Lawrence. Second edition. 287 pages, indexed and illustrated by photographs, maps, charts. Macmillan, New York, 1938. $3.25.

The first edition of this title which appeared four years earlier (1934) was an excellent exposition of the principles of genetics in their relation to the origin and breeding of important garden plants. This second edition is fully justified by its further excellent treatment of new material in respect to the recent developments in genetical knowledge. Various chapters have been rewritten. Of new material presented, mention may be made of (a) linkage in corn, (b) cytological and breeding data on chromatid segregation, (c) the genetics and cytology of *Iris* species, (d) discussion of hybrid vigor, (e) data on the chemistry and genetics of flower colors, and (f) additional information regarding bud sports, chimaeras, polyploid plants, and sterilities in plants. The more technically trained horticulturists, botanists and geneticists will find in this volume the practical applications of principles; the average gardener, seedsman, or plant breeder will find much of immediate interest regarding what we will want to know about the plants with which he works.

A. B. STOUT.

Backdrop for a Drama

AMERICAN EARTH. Carleton Beals. 500 pages, bibliography, index. J. B. Lippincott, Philadelphia, 1939. $3.

It is scarcely necessary at the present date to call attention to Steinbeck's much discussed novel, "The Grapes of Wrath." It is, however, a little unfortunate that so many have approached it only as a piece of fiction. For those and others who have scoffed, saying that it was "over-written . that no such people as the Joads ever did — or could — exist," I can only recommend that they carefully follow the pages of Mr. McWilliams' story of migratory farm labor in California, "Factories in the Field." It is a stark and realistic documentation of "The Grapes of Wrath."

But then, if there are some who feel that the present situation is only a passing phase; that "California is far away and its troubles all its own," let them

read Carleton Beals' "American Earth." Here is the "Biography of a Nation." An account, not written of the wars which histories are so prone to relate, but the story of the blood and bone that has gone into the building of America; of the meanness that has beset our all too often misguided honesty; of the selfishness, the bigotry and greed that has laid waste the priceless patrimony of this, our land.

In the first part of "American Earth," Beals has painted — sometimes with a touch of delicately shaded wistfulness for days that are forever gone, again with the stronger pigments of ribald laughter and earthy anecdote, and always deftly— a backdrop to the drama of present-day America.

For those who think that the plight of California is unique, Beals has, in the second part of his book, brought together sufficient documented statement and personal observation to prove that there are "Joads" in every region of our land; that we have loosed the fearful lightning and, of necessity, must face the problem of an important and far reaching re-evaluation of the human factor in our national economy. As he remarks, "What lies ahead on the new trail no man yet discerns. That it will be more significant and important than anything in the past, no man doubts."

W. H. CAMP.

Queen of Autumn Flowers

HARDY CHRYSANTHEMUMS. Alex Cumming. 168 pages, indexed and illustrated. Whittlesey House, McGraw-Hill Book Co., New York, 1939. $2.50.

"Hardy Chrysanthemums" by Alex Cumming is a very complete work, well written and a credit to the author. It contains a great deal of data most interesting to those who are deeply interested in this class of plants.

The results of Mr. Cumming's work, the production of the Korean hybrids, is a most commendable one and no doubt gives great pleasure to many people, particularly those living in the extreme East, or in any locality where frosts do not occur prior to mid September.

Everyone interested in chrysanthemums should avail themselves of an opportunity to peruse this work.

ELMER D. SMITH,
Chrysanthemum Specialist,
Adrian, Michigan.

Now You Can Grow Succulents!

SUCCULENTS FOR THE AMATEUR. [J. R. Brown, Alain White, Boyd L. Sloane, G. W. Reynolds.] Edited by Scott C. Haselton. 167 pages. Illustrated by photographs and colored plates, indexed. Abbey Garden Press, Pasadena, Calif. 1939. Heavy paper cover, $1.50; cloth bound, $2.

With the increasing popularity of succulents in American horticulture, it has been a long-continued disappointment that there was no book giving cultural information for amateurs in this country. Succulents for the Amateur, while its instructions are condensed and brief, is nevertheless a welcome horticultural event, and should be of great value to the beginner in the growing of these fascinating plants, thus furthering their popularity.

The illustrations are well chosen and excellent, well calculated to arouse interest in both amateur and professional growers. The only unfortunate thing is that too little information is given as to culture under glass, which by reason of our moister climate, is the only satisfactory method of growing these plants in the East. Altogether, however, there is such a wealth of good description and illustration coupled with a low price as to place the book on the "must" list of all interested in growing succulents.

E. J. ALEXANDER.

Every Plant a Hero

WONDER PLANTS AND PLANT WONDERS. A. Hyatt Verrill. 296 pages, illustrated; indexed. D. Appleton Century Co., New York, 1939. $3.

This is a book not recommended for the man with a timid soul to read before retiring for the night, for he would have visions of the vegetable centipede chasing him, of cannibal plants that might devour him, curious cow trees that he could milk, or plants with poison daggers hanging on them ready to drop on him while he rested.

Many botanical facts are to be found, but to maintain interest, every plant is made a hero that has struggled against terrific odds and has a story to tell that is strange beyond belief. One learns of giant grasses towering sixty feet high, with stems six inches thick that form impenetrable jungles. However, the author is describing some of the bamboos, among

which such large plants are not unusual. Such a description catches the interest of the reader, but is very misleading concerning the actual facts.

A chapter on the intelligence of plants is most unusual and interesting, for one is led to believe that there is scientific evidence that plants possess certain senses, and that their roots or tendrils serve as crude ganglions, and take the place of brains. Some plants even have the ability to recognize individuals, and experiments are described of the "taming" of certain vines. According to the author, it is generally conceded that plants possess eyes very similar to the eyes of many of the lower animals. Other remarks will be found which add to the fascinating features of plant wonders but which are questionable concerning the whole truth of scientific facts.

Common food and beverage plants, textile plants, and many important plants of commerce and industry are also included. In general, the book lives up to its title, and will furnish an evening of reading about plants that will not be lacking in thrills.

ERNST NAYLOR,
University of Missouri.

Brief Notes on Varied Books

Gift Book from the Desert

PLANTS OF SUN AND SAND. Stanford Stevens. 47 pages, drawings by Gerry Peirce. The Print Room, Tucson, Arizona, 1939. $1.

As delightful a little book as one could ask for is the plywood-covered Plants of Sun and Sand. It contains 16 wash drawings, delicately executed, showing plants in the southwestern desert; also many pen and ink sketches all by the etcher, Gerry Peirce. The text is brief, informative, and pleasant.

All About the Big City

NEW YORK CITY GUIDE. Guilds' Committee for Federal Writers' Publications, Inc. 708 pages, indexed, and illustrated with drawings, photographs, and maps. Random House, New York, 1939. $3.

Scarcely an inch of New York City or an hour of its history has been untouched by the Federal Writers' Project in preparing the New York City Guide. Here one can learn how and where to be entertained or instructed, where to live, dine, send the children, shop, attend church, or travel in the city, or read of what happened once upon a time at almost any given spot in the metropolis. The New York City Guide has allotted to The New York Botanical Garden two pages of text and a photograph, besides a share of the map of Bronx Park, out of the 648 pages of description and more than 200 pictures and maps.

Useful Lists of Woody Plants

COMPILING A NEW NURSERY LIST. L. C. Chadwick. 96 pages, indexed, keyed. American Nurseryman, Chicago, Ill. 1939. $.40.

Of exceptional value to all growers of woody plants, as well as to the nurserymen for whom it was especially prepared, L. C. Chadwick's Compiling a New Nursery List seems to answer every practical question that a grower might ask.

The plant groups treated are vines, ground covers, low or dwarf shrubs, small shrubs, medium-size shrubs, large trees, small trees, and standard trees. Of special interest are the lists of plants to discard, following a list of first and second choice plants to cultivate. A 27-page list names selected plants from each group which would meet more than 200 different requirements of site, soil, climate, or use.

Once a plant is selected from the many lists, the grower has only to turn to the insert in the book to find, by means of a key, the name and address of any nursery which can supply the plant.

How to Pronounce It

NEW PRONOUNCING DICTIONARY OF PLANT NAMES. Compiled by E. R. Robinson. 64 pages. Florists' Publishing Co., Chicago, 1939. $.25.

Here is a very sensible vest-pocket volume which gives the correct pronunciation of nearly 3,000 generic and specific names, a few uncommon-sounding common names, and botanical and horticultural terms, each with a definition or description in the fewest possible words for adequacy. The pronunciations indicated reveal an unbiased study of authorities. The key to the sound of each letter is exceptionally easy to follow. An earlier edition, of much smaller content, lacked the definitions which give this volume special value.

CAROL H. WOODWARD.

Memory of Doctor Small Honored in Louisiana

AS a tribute to the work of the late Dr. John K. Small in the discovery and preservation of many of the native irises of the southern states, the Louisiana Iris Conservation Society held a memorial meeting at Tulane University, New Orleans, Sept. 29. Dr. Small, until his death on Jan. 20, 1938, was Chief Research Associate and Curator at The New York Botanical Garden.

The program of the society at the memorial meeting consisted chiefly of addresses extolling the work of Dr. Small. Peter A. Chopin, florist, spoke first on the organization of the Louisiana Iris Conservation Society, of which Dr. Small had been designated Honorary President General. James M. McArthur, director of nature study and school gardens in the New Orleans public schools, told what the society had done in teaching school children to conserve wild iris. M. E. Polson, president of the Floral Trail Association, spoke of iris gardens on the trail, while Wilson S. Callender of the Association of Commerce, telling how the work of Dr. Small and the Iris Society have attracted strangers to New Orleans, proposed planting the highways of Louisiana with native iris. Dr. W. E. Penfound, of the department of botany at Tulane, related what Dr. Small had done for the botany of Louisiana. His "Flora of the Southeastern States" has been a Bible to all people interested in the flora of the state, he said. Gaspar A. Bossetta, attorney and conservationist, spoke on what the Iris Society, inspired by Dr. Small, has done to conserve native wild flowers. The program was closed with an address by Rev. James J. O'Brien of Loyola University on "How the Eminent Botanist Illustrated Devotion to Duty." Boy Scouts then sounded taps.

Some weeks before the memorial, the society called on all parishes in the state which had not yet planted their quota of iris in the John K. Small Louisiana State Iris Study Field in Audubon Park, New Orleans, to send plants or roots at once, in order that they might be growing when people were gathered for the meeting.

Another iris planting also flourishes in New Orleans. This one is in what was once waste land around City Park, and is devoted to the culture of the native irises which have been planted there by people who otherwise would have destroyed them when cutting weeds on their property. The individual growers then sell the irises from the City Park area, which was established through the influence of Mrs. May Wilkenson Mount, Founder and President of the Iris Conservation Society.

The large memorial committee for the meeting in New Orleans was headed by Mr. Polson, Frank E. Neelis, Mrs. Mount, and Mrs. J. J. McLoughlin, chairman of the Iris Study Field. Brigadier General E. A. McIlhenny is credited with the financial assistance which made the memorial possible, and seedsmen and florists of New Orleans published the society's bulletin for the occasion.

Notes, News, and Comment

Rhododendrons. About 400 rhododendrons have been presented to The New York Botanical Garden by the Hicks Nurseries of Westbury, Long Island. They consist chiefly of the species *maximum, catawbiense,* and *carolinianum* and hybrid seedlings, and all of them are of a size suitable for decorative planting. They are being set out on the west side of the grounds, just inside the new fence which is under construction. About 100 miscellaneous shrubs, including many azaleas and other ericaceous plants, have also been presented by Hicks.

The firm of Bobbink & Atkins of Rutherford, N. J., has made the Garden a gift of 80 rhododendrons in 40 varieties, while the Bagatelle Nurseries, Huntington L. I., have presented 46 plants in 23 varieties. The Princeton Nurseries in New Jersey have sent 14 rhododendrons and the F. & F. Nurseries of Springfield, N. J., 8 specimens for the collection. These latter groups are being placed near the Rhododendron Glade, which leads to the north entrance of the Thompson Memorial Rock Garden.

Conifers. Clarence McK Lewis, a member of the Board of Managers, has given the Garden 49 pine trees, 16 firs, and 11 spruces, totaling about 20 species, several of which are new to the collection, from his estate at Sterlington, N. Y. These are being placed among the other coniferous trees in the Pinetum.

Lilies. Among recent gifts of herbaceous plants to The New York Botanical Garden were 114 specimens of *Lilium regale* and 56 hybrid lilies from Dr. L. Horsford Abel of White Plains.

Orchids. Mrs. William K. du Pont of Wilmington, Del., has recently presented the Garden with 17 orchids from her greenhouses. Most of them are rare species, and they form a valuable addition to the Garden's steadily increasing collection of tropical orchids.

Classes. More than 100 students have registered in the course in Practical Gardening being given on Thursday evenings at the Botanical Garden. At the end of two years those students who have successfully completed the work will be awarded a certificate. This term's subject is "Fundamentals of Gardening," given by T. H. Everett. The course will continue after the first of the year with a similar series of 12 lectures by P. J. McKenna on "Outdoor Gardening." New students will be admitted to the course at this time.

In the Science Course for Professional Gardeners, 36 are registered, about half of whom are student gardeners and apprentices at The New York Botanical Garden. Six are from the New York City Park Department. The subjects this term are Systematic Botany A, taught by Dr. H. N. Moldenke, and Plant Morphology, by Dr. H. W. Rickett.

Medal. Col. Robert H. Montgomery of Cos Cob, Conn., and Coconut Grove, Miami, Florida, is the recipient this year of the gold medal of the Massachusetts Horticultural Society. It was awarded particularly in recognition of the work he has done as an amateur in assembling the great collection of plants of warm regions in the Fairchild Tropical Garden at Coconut Grove, Florida.

Memorial. A membership in The New York Botanical Garden has been established by Dr. George T. Semken of New York in memory of his wife. For thirteen years, until her death this fall, Mrs Semken had been a member and friend of the Garden.

Autumn Flowers. The day that the New York newspapers announced that the dahlias at the Botanical Garden would be at their height, Sunday, Oct. 15, about 8,000 people came to visit this outdoor display, meanwhile seeing the last of the season's hardy asters and the first few flowers on the early chrysanthemums, which came into full bloom the following week. The night of Oct. 15 a frost nipped some of the leaves of the dahlias, and a second the following night blackened the remainder. The plants kept on blooming, however, but the foliage was dead. The blossoms were taken Nov. 3.

Hardy chrysanthemums have been, if possible, finer than ever this year, and have attracted a great many visitors. It is estimated that about 5,000 saw them the afternoon of Sunday, Oct. 29, and approximately the same group also went through the main conservatories.

Student Gardeners. The international situation has now returned the last of the present year's exchange student gardeners to their home countries. Donald Samson returned to The New York Botanical Garden from Edinburgh the last of October, and on Oct. 28 Joseph John Elliott, who had come here on exchange from the Royal Botanic Garden in Edinburgh, returned on the Manhattan to the British Isles. He had been in this country since April.

Girl Scouts. Six hundred members of the Bronx Council of Girl Scouts celebrated the National Founder's Day Oct. 29 with a program and pageant in the lecture hall of the Botanical Garden, in the museum building. A willow oak was afterward planted with a brief ceremony inside the grounds near 200th St.

Visitors. Mr. M. R. Skipworth of Dunedin, New Zealand, visited The New York Botanical Garden October 23 and showed special interest in the school for gardeners organized here. He has been sent on a tour of the world before assuming his new position as superintendent of botanical garden parks and reserves of New Zealand.

Other visitors during October included John A. Small from Rutgers University; Carlos Muñoz, University of Chile, who has been doing a year of special research in this country; A. L. Carrión, School of Tropical Medicine, San Juan, Puerto Rico; Jesse H. Buell, Appalachian Forest Experiment Station, Asheville, N. C.; Alain White, Litchfield, Conn.; Carl T. Ramsey, Dorset, Vt.; Miss H. A. Diddens, Baarn, Holland; John C. Wister, Philadelphia; Mr. and Mrs. Claud L.

Horn, Mayaguez, Puerto Rico, and Winifred Walker, artist for the Royal Horticultural Society in London and a recently elected Fellow of the Linnean Society of London.

Visiting Groups. Two large classes from Our Lady of Mercy Boys School made midweek trips to the Garden in September and October. They were conducted around portions of the flower borders, the tree collections, and the main conservatories. A dozen girls from New Rochelle, with two leaders, were escorted on a tree walk Oct. 28.

Lectures. Among addresses recently given by members of the Botanical Garden's staff are "Shady Gardens" by T. H. Everett before the Plainfield Garden Club; and, by Dr. H. N. Moldenke, "New Jersey Wild Flowers," Rumson Garden Club; "Portraits of Local Plants," Brooklyn Institute (botany section); and "A Naturalist in Florida," Riverdale Garden Club.

Conference. At a special conference of the scientific staff and registered students of the Garden on October 10, Dr. A. B. Stout exhibited fruits of about 50 different grape seedlings which bear seedless or nearly seedless berries, and he summarized the twenty years of his work on seedlessness in grapes. A total of about 215 individual grape seedlings which bear seedless fruits have been obtained by breeding and at least 50 of these are being studied and tested for possible use in vineyard culture. This project is one of co-operation between The New York Botanical Garden and The New York State Agricultural Experiment Station at Geneva, N. Y.

Mycological Herbarium. One of the recent accessions to the Mycological Herbarium is a series of exsiccati issued under the title "Fungi Latvici Exsiccati" by J. Smarods of Latvia. The series contains 800 specimens, put up in 16 volumes of 50 specimens each, all the volumes neatly bound in board covers. The specimens, which are unusually ample in material, are each provided with a printed label containing all the necessary data. This is considered an exceedingly valuable addition to the collection.

Forestry. Dr. A. B. Stout spent two days late in October at the Hopkins Memorial Experimental Forest at Williamstown, Mass., in consultation with Dr. E. J. Schreiner regarding plans for the tree-breeding work now being developed by the U. S. Forest Service. Dr. Stout is a collaborator in this project.

Books. Among recent gifts to the library are two Italian volumes, one a brief history of Italian agriculture, the other a contribution to the study of the black moth of the fig, its biopathological and occasional simbiotic relationship to the fruit. A third gift is a volume on gardening by F. L. von Sckell, published in Munich in 1825 and illustrated with woodcuts showing planting plans.

Field Botany. A group of high-school teachers of biology is enrolled in a new course in Field Botany given at The New York Botanical Garden in co-operation with the Association of Biology Teachers of New York City. The course covers identification of and information about the plants of the New York area. Alertness credit will be given to teachers who complete the work satisfactorily. The fee is five dollars. Mr. George T. Hastings, chairman of the biology department of Roosevelt High School, is co-operating with Dr. W. H. Camp, who is in charge of the program.

Authors and Reviewers. Mrs. Rosetta E. Clarkson, who is contributing the leading article this month, is the author of "Magic Gardens," being published Nov. 21 by Macmillan.

Elmer D. Smith, whose commendatory review of Alex Cumming's "Hardy Chrysanthemums" appears on page 263, died of a heart attack Nov. 10, while attending the opening of the annual convention and exhibition of the Chrysanthemum Society of America in Indianapolis. He was 85 years old and had long been known as the dean of chrysanthemum growers in America.

The photographer, Edward Steichen, who reviews L. H. Bailey's "The Garden of Larkspurs," ranks as one of the country's leading breeders of delphinium.

Theodor Just, who comments on S. G. Jones' "Introduction to Floral Mechanism," is the editor of the *American Midland Naturalist* and co-author with Carl Wilson of a comprehensive article on "The Morphology of the Flower" which appeared in the February *Botanical Review*.

Ernst Naylor is co-author with H. W. Rickett of a laboratory manual in botany.

Corrections. "Commercial Flower Forcing" by Laurie and Poesch, which was reviewed in the September issue of the Journal, is priced at $4.50. It is published by Blakiston.

"Anatomy of Food Plants" by Herman E. Hayward, also reviewed in September, is published by the McGraw-Hill Book Co., Inc.

Current Literature At a Glance*

By Virgene Kavanagh

Forests. "Florida National Forests" published by the Forestry Service, U.S.D.A., contains descriptions of the development and use of the national forests as experimental plots, as timber and naval stores reserves, as game refuges, and as recreation centers. The Florida reserves are in the northern part of the state, the largest near Tallahassee. A brief description of twenty of the most interesting trees and flowers in the Choctawhatchee and Ocala National Forests is included.

Rock Gardens. Since not every plant and rock desired can be included in a rock garden, what to leave out is as important as what to put in. Henry T. Skinner tells what to select in a well illustrated bulletin "The Rock Garden," showing good and bad rock gardens and discussing problems in the design and construction of good ones. Informal gardens are usually most satisfactory when they conform to the rock arrangements found occurring in nature in the locality of the garden, he points out. Formal gardens are apt to be more suitable for small bits of ground in cities than are the informal gardens. This is found in Cornell Extension Bulletin 403, N. Y. State College of Agriculture, Ithaca, N. Y.

Nutrition. Potassium deficiency does not produce marked symptoms in tomato plants grown at low nitrogen levels, although the same amount of potassium reduces growth much more at high nitrogen levels. In other words, it is the proportion, rather than the amount, that matters.—Technical Bulletin 73, New Hampshire Agri. Exp. Sta., Durham, N. H.

Tree Pests. Since insects do so much damage to trees, anyone trying to maintain shade trees or a wood lot should see "Leaf-feeding Insects of Shade Trees," Bulletin 353, Mass. Agri. Exp. Sta., Amherst, Mass. 1938. It includes pictures, descriptions, and life histories of the insects and methods of control.

Another recent bulletin on shade tree injury is "Control of Shade Tree Borers." —Circular 84, Oklahoma Agri. Exper. Sta., Stillwater, Okla.

Insects. "The 4-H Club Insect Manual" provides a simple guide for the collection and identification of some of the common insects and gives a few of the typical life histories.—Miscellaneous Publications 318, U.S.D.A., Washington, D. C.

Oxford. "Forestry Abstracts" is a 1939 publication of the Imperial Forest Bureau, Oxford. It should be of valuable service to those interested in forestry.

Coastal Flora. The plants of the salt marshes are a familiar sight to most people living in the coastal areas, but many of us do not know them by name. Descriptions and pictures of some of these plants are given in "Wildlife of the Atlantic Coast Salt Marshes" by W. L. McAtee.—Circular 520, U.S.D.A., Washington, D. C.

Apples. To produce bigger and better apples it is sometimes necessary to reduce the number of fruits on a tree, or even to prevent a tree from bearing one year. Once it was necessary to remove the young apples by hand-picking them. Now some substances have been discovered which will kill all or part of the blooms so the fruit will not set without doing too much damage to the tree. Cresylic acid is one of the most effective substances that have been tried. —Circular 28, Missouri State Fruit Exper. Sta., Mountain Grove, Mo.

Naturalists. The names of American naturalists with their dates, fields, and biographers have been assembled by Paul H. Oehser in "A Handlist of American Naturalists, Based on the Dictionary of American Biography." It is issued as a reprint from the *American Naturalist,* Nov.-Dec. 1938.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

THE NEW YORK BOTANICAL GARDEN

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The New York Botanical Garden is located in the Bronx, immediately north of the Zoological Park at Fordham Road, and at the south end of the Bronx River Parkway. It may be reached by local trains from Grand Central Terminal to the Botanical Garden Station (200th Street).

To reach the Garden by the Elevated and Subway systems, take the Third Avenue Elevated to the end of the line (Bronx Park Station): from the East and West Side subways, transfer from the Lexington or Seventh Avenue line to the Third Avenue Elevated at 149th Street and Third Avenue. By Eighth Avenue subway (Independent system) take a C or CC train to Bedford Park Boulevard (200th Street), then walk east to the Garden.

To come by motor from the city, drive north on Grand Concourse to Bedford Park Boulevard (200th Street), turn east there, and cross the railroad bridge toward the Garden grounds.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

CAROL H. WOODWARD, Editor

December, 1939

VICTORIA REGIA A PORTION OF THE UNDERSIDE OF THE LEAF
Cover Photograph by Fleda Griffith

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IN THE LIBRARY

The motion picture industry is one of the most persistent users of the library at The New York Botanical Garden. It is often from scientific studies of plants of distant lands, sometimes made by botanists of an earlier century and illustrated in gigantic folio volumes, that the foods and flowers and even the scenic backgrounds are derived for films which show a region unfamiliar to the producers.

Manufacturers of innumerable products, retail stores, explorers, travelers, professional lecturers -these are a few of the organizations and persons that find in the library at the Botanical Garden information which is not otherwise available—at least not within 200 miles of New York, and if a rare book is involved, possibly nowhere else in the country.

Readers would be surprised to learn how many novels have been set against a background dug out of books at the Botanical Garden, and how many magazine illustrations have the same source.

Many a flower or leaf design on a textile or other example of craftsmanship has come from a book at the Garden.

Flower show exhibitors and garden club members preparing programs and papers get much of their essential information here. A portion of the audience at the Saturday afternoon lectures always visits the library to delve into books on the subject of the day, and some of them frequently return for further reading the following week.

Professional and amateur gardeners alike depend on the vast store of information in the Garden's 48,000 bound volumes on horticulture and botany in their search for new plants, identification of those they have, and for cultural directions and facts of interest about the plants they grow.

Workers on several projects of the W.P.A. use the library daily for special jobs of indexing, translating, and research, in one instance preparing a report on botanical manuscripts which are in the possession of the Garden

The use of the library regularly by scientists and students and the influx of students and teachers at every vacation period are taken for granted in a scientific institution. But the services of the library—like those of the Garden itself—reach out to other people in ways for which no other type of institution is specifically equipped.

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N.Y. STATE
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The Leaf Of Victoria Regia

By H. W. Rickett

Engineering Takes a Cue From a Waterlily

WHEN Joseph Paxton began to build greenhouses, more than a hundred years ago, he was impressed by the heavy construction and interior gloom of the buildings then in use. Walls were of brick, roofs of massive beams covered with small thick panes of glass. Such construction was not conducive to the best growth of plants, especially in the scanty sunshine of England.

Paxton devised lighter beams which carried larger sheets of glass, and, partly as a result of the application of such principles, succeeded in building larger and lighter greenhouses than had been seen before.

While he was manager of the estate of the Duke of Devonshire at Chatsworth in Derbyshire he designed and erected a group of greenhouses which became world-famous. The principles so successfully applied were used also in the construction of the great Crystal Palace erected in Hyde Park for the exhibition of 1851.

The Crystal Palace

This famous building, which Paxton designed, was nearly 2,000 feet long and more than 400 feet wide. Some 19 acres were enclosed. Its great transept rose 108 feet and enclosed several full-sized living trees. Through the long wings, 66 feet high, ran two stories of galleries. The whole vast framework was roofed with glass; 18,392 panes were used, each 49 inches long. It was the largest glass house ever erected, and probably has not since been equaled.

The framework supporting the galleries and the roof was of iron. Hollow iron columns, which extended in several rows throughout the great length of the building, carried a system of horizontal iron beams of the now familiar type known as I-beams. Weight was kept at a minimum and light at a maximum by perforating the web between the flanges of the beams so that from the side they presented a lattice-effect.

The vertical depth of the beams enabled them to resist bending, and they were prevented from toppling over by meeting each other at right angles.

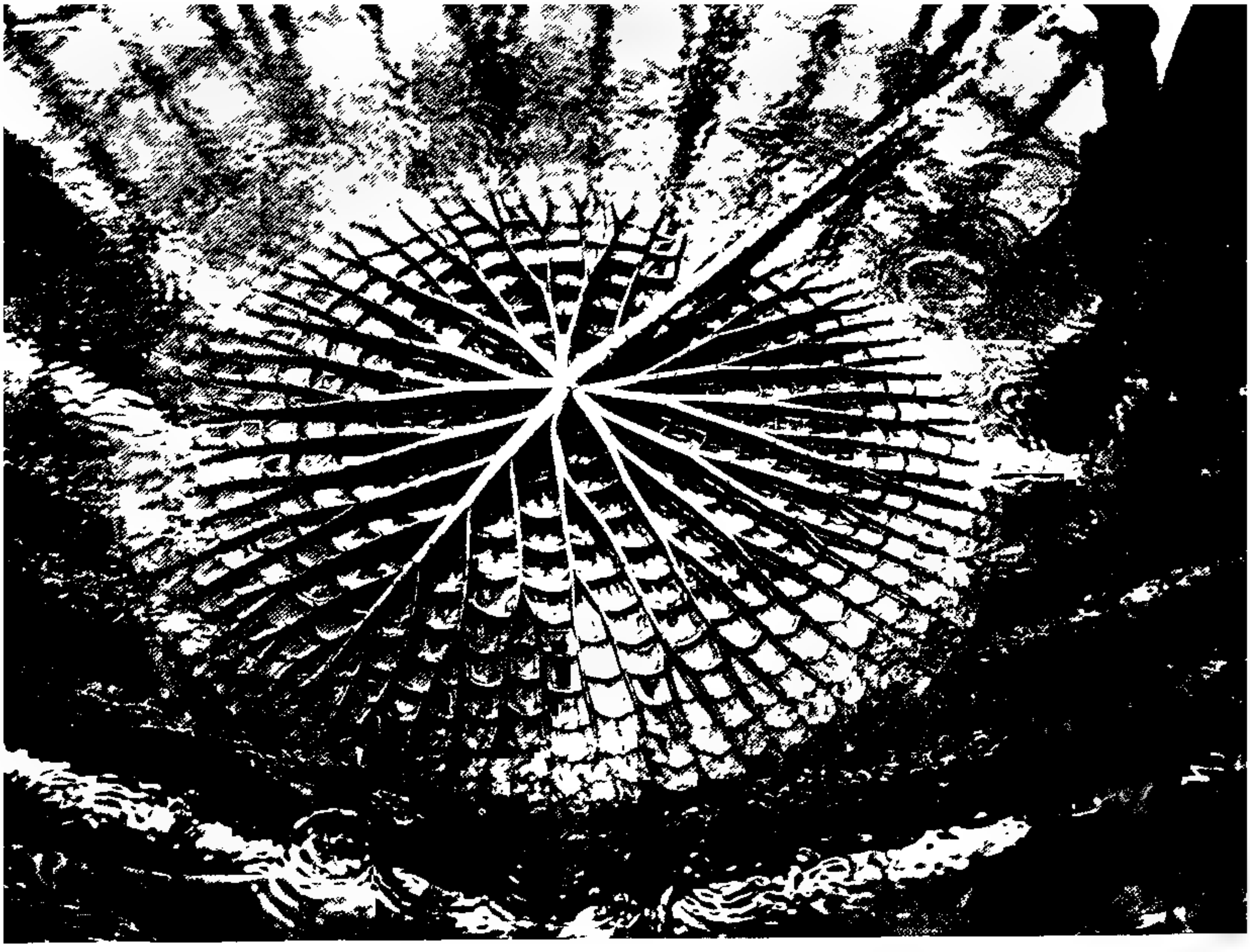
The principle of spreading structural material out thin in the plane in which stresses are likely to occur is not original with man or limited to his creations. Paxton (who was a gardener before he was a builder) described his inspiration in a meeting of the Society of Arts, to which he exhibited a leaf of *Victoria regia*, the great waterlily of South America. "Nature was the engineer," said Paxton. "Nature has provided the leaf with longitudinal and transverse girders and supports that I, borrowing from it, have adopted in this building."

Discovery of Victoria regia

This plant had been discovered nearly fifty years before by Haenke and LaCueva as they traveled down the Mamoré River through what is now Bolivia. It is said that Haenke, when he first saw the enormous round leaves floating on those quiet tropical waters, fell on his knees in a transport of admiration and gratitude to the Creator of all things. They camped at that place and left it only with regret. Subsequently the waterlily was found by several other explorers in many parts of South America; but for years the western world knew it only from the accounts which they brought back, and from shipments of seeds, roots, and portions of leaves and flowers which arrived—always dead—in various centers of botanic learning. Living seeds were finally imported into England in 1849, and grown to maturity in several gardens. The first plant to bloom was in the greenhouse specially built for it by Paxton at Chatsworth.

Strength of the Leaf

One who sees for the first time a leaf of *Victoria regia* floating on the water is apt to ask himself: "Would it hold me up?" It is said that the Indians, when they gathered the edible seeds ("water-maize") of the waterlily, placed their children for safe keeping on the leaves (known to them as the "water-platters"). A number of old photographs of well-dressed white children sitting happily on these novel rafts attests the plausibility of this legend. It is only necessary to place a board on the leaf to distribute the weight evenly over the surface. Indeed, if this precaution is taken, a large leaf will support a man weighing 150 pounds. One investigator reported pouring sand onto a leaf to the amount of 400 pounds before it sank. Considering the strength and buoyancy which this represents, it is the more remarkable that the texture of the leaf is very delicate. It is easily punctured by a small object falling from a small distance. This delicate blade floats as gently as a film of oil on the water, yet resists the depredations of animals and the impacts of waves



Under side of a leaf of Victoria regia, with reflections from the dome of the aquatic house in which it was grown.

and wind, and can support weights of more than a hundred pounds providing only that the load is distributed evenly over the surface.

Design for Engineers

The clue to this curious combination of qualities is seen on the lower surface. Here we find the structure to which Paxton referred in the words quoted above. The delicate flat blade is spread over a system of large ribs, Paxton's "girders," which radiate from the point where the stalk is attached. The ribs are narrow but deep; the free edge is somewhat broadened, but the web which connects this with the blade is quite thin. The main ribs of a comparatively small leaf are more than 2 inches high at the center of the leaf, and their thickened margins are less than an inch wide. Half way to the circumference they are 1 inch high and the edges only ¼ inch wide. These ribs are supported in a vertical position by cross-ribs, which run parallel to the circumference of the leaf and thrust against the sides of the main ribs; many of them are an inch high. These in turn are supported by sloping narrow buttresses firmly anchored in the leaf-blade, and holding the cross-ribs upright.

This is the structure, a product of nature in a remote wilderness, which inspired the design for a great exhibition-building in a civilized country on the other side of the world. Ever since Paxton's day, the construction of greenhouses has involved similar principles.

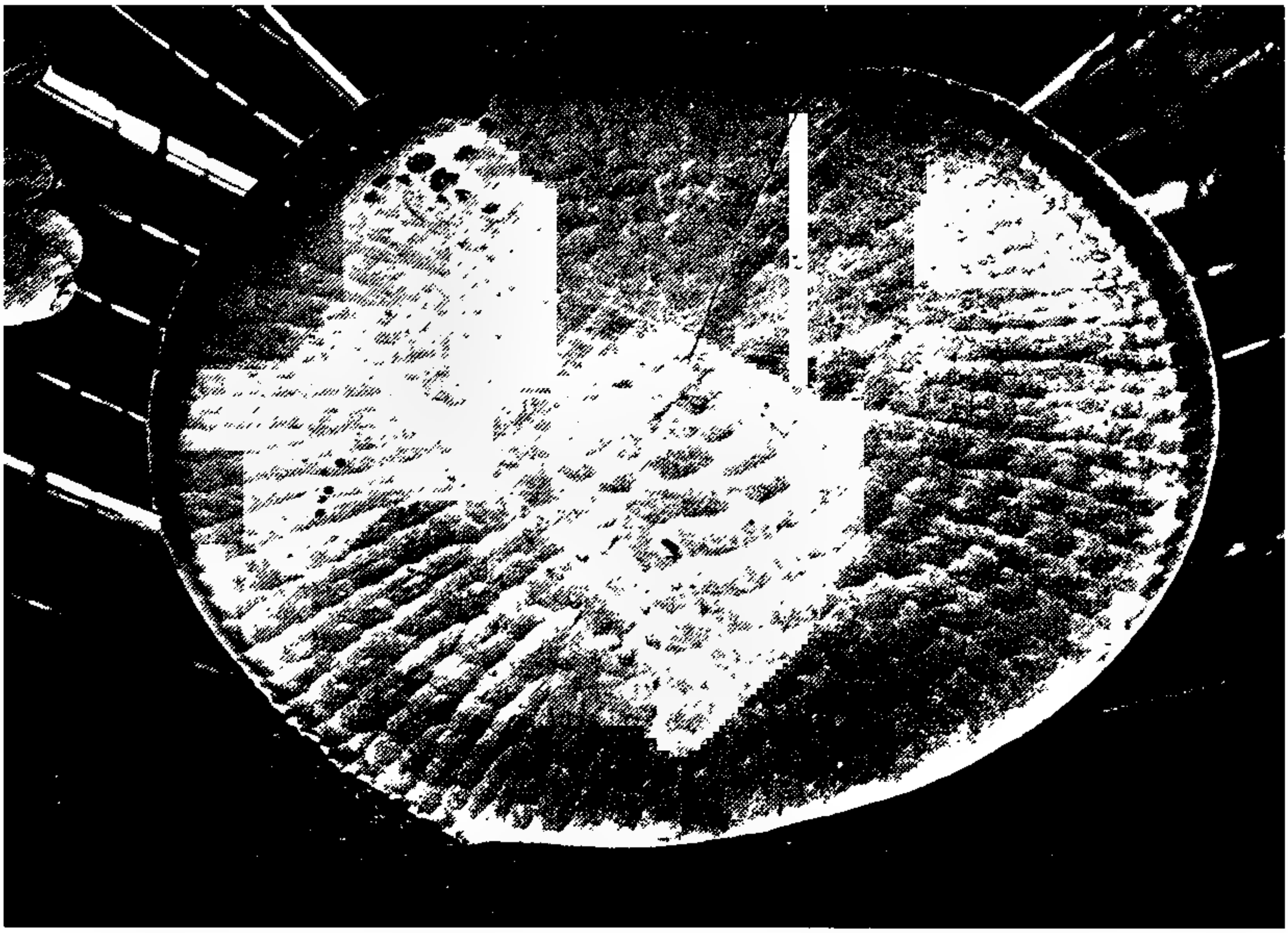
Under the Microscope

Structural design does not cease with the gross arrangement of parts, but extends to minute internal details; the microscope is necessary to the understanding even of this enormous leaf. The ribs which appear so solid and massive are really structures of great delicacy. They are composed of hollow air-filled tubes lying side by side, separated by thin membranes from their lateral neighbors and interrupted longitudinally by perforated partitions; the bulk of the great rib is actually mostly air.

As every botanist knows, the microscope reveals beauty not accessible to the unaided eye. The walls of many of the tubes that compose the ribs are lightly suffused with pink. Into their cavities project curious and delicate hairs, each composed of several rigid and pointed arms spreading like the rays of a star.

Each tube is a structural unit which resists bending far more than would the same amount of solid material disposed in a solid strand; this is why hollow iron columns, rather than solid iron rods, are used as sup-

The buttressed structure of a portion of the under side of a leaf of South America's royal waterlily, approximately natural size



A typical leaf of Victoria regia, revealing its bilateral, rather than radial, construction, this leaf was about 4 feet across.

ports in such buildings as the Crystal Palace. The rib, which is a bundle of such tubes arranged in a vertical plate, possesses great strength combined with light weight.

The air-filled passages are of value to the waterlily not only for the strength which they afford to the leaf, but because they provide a means by which gases can circulate throughout the plant. The gases of the air enter the leaf through minute openings in its upper surface, and can thus reach the immersed parts; they can move also to the leaf-stalk, which begins where the ribs converge, and down through the large air-passages of this to the submerged parts of the plant.

The ribs and the leaf-stalk are armed with long sharp spines. There seems to be no foundation for the belief held by the Indians that these are venomous. They are, however, sharp enough to make handling the leaf painful, and undoubtedly save it from being devoured by fish

The Structural Pattern

The main ribs of the leaf were described above (as in most writings that refer to them) as radiating from the center. Actually this is not accurate. The leaf is a bilateral, not a radial structure. The midrib or main vein continues the line of the leaf-stalk, as it does in most leaves.

From it several lateral branches extend to either side, arranged roughly (but not quite) in pairs; the lateral veins fork repeatedly, so that they give support to that part of the blade which lies to either side of the midvein. The lowest laterals (those nearest the leaf-stalk) are the largest and fork immediately after leaving the midvein; their branches fork again, and the process is continued so that each of these laterals takes care of about a third of the entire disc. (The veins of other round leaves, such as that of an ordinary geranium, are arranged in much the same way.) The vein that extends straight back from the point of attachment of the stalk and appears to continue the main vein is evidently formed by the lowest branches of the lowest pair of laterals, which swing around and grow together along this line, completing the circle of the leaf. This interpretation is borne out by examination of the first leaves formed on a young plant. These are not circular but arrow-shaped (like those of more familiar species of waterlilies); the stalk is attached between the two spreading barbs of the arrow, the midrib extends from the stalk to the pointed tip. Successive leaves are rounder, and finally leaves appear of the mature form, in which the two backward-pointing wings are united along a line extending back from the stalk; this line may be clearly seen on the upper surface of a mature leaf.

Tuberous Begonia Species Native To The Americas

By Hildegard Schneider

MOST of the summer flowering tuberous begonias that are grown today have been derived from seven wild species, all of which are native to the Andes of Bolivia and Peru. Of these seven, five were introduced and distributed by James Veitch & Son of London, England. These five are *Begonia boliviensis, B. Pearcei, B. Veitchii, B. rosaeflora* and *B. Davisii.* E. G. Henderson, also of London, was responsible for the introduction of *B. Clarkei* and *B. cinnabarina.*

Through hybridization of these early introductions numerous beautiful varieties have been obtained, and these strains are constantly being improved, the modern larger-flowered kinds replacing many of the older forms. For convenience the group name *Begonia tuberhybrida* is applied to these hybrids. Although modern *tuberhybrida* varieties produce flowers more varied in color range and immensely larger than those of the wild species, these latter have an appeal of their own and are of particular interest to the collector.

In addition to the seven mentioned above, many other tuberous-rooted species are worth growing. Those marked with an asterisk in the

following alphabetical list of New World species are in cultivation at The New York Botanical Garden. The citations in parentheses indicate where illustrations of these species may be found.

B. Balmisiana (Mexico), discovered by Ruiz in 1795, grows on cool mountainsides at an altitude of about 8,000 feet. Flowers small, pale pink, in terminal racemes. Small bulbils in the leaf axils.

**B. Baumanni* (Bolivia), was named in honor of E. Napoleon Baumann of Germany, who received seed from the discoverer, Dr. Sacc, of Cochabamba, Bolivia, in 1886. Grows very abundantly in moist valleys of the northern Cordilleras. The tops are liked as food by animals. It is short-stemmed; leaves are green and reniform; flowers large, rosy-red. In its native habitat the tubers grow to the size of a small melon. (Bot. Mag. *tab. 7540.* 1897) Distributed from France by Lemoine, around 1890.

B. boliviensis* (Bolivia), with nodding bright scarlet flowers, was originally discovered in 1857 by Weddell and introduced to gardens by Pearce in 1865. First exhibited 1867 in Paris. The first *tuberhybrida* begonia raised was the result of crossing *B. boliviensis* with an unnamed Andean species and bore the name ***Sedeni.* (Bot. Mag. *tab. 5657.* 1867) The plant at The New York Botanical Garden, which has not yet bloomed, came as *B. boliviensis* ***Superba.***

B. bulbifera (Mexico) was brought into cultivation with the soil of an orchid, beside which it was growing. Sent to the Berlin Botanic Garden by Mr. Schiede around 1828. (Link & Otto, Ic. Plant. Rar. *tab. 45.* 1828-31)

B. californica (California), which has pink or purple flowers, grows to about 18 inches in height.

B. cinnabarina (Bolivia) was first raised from seed sent from Bolivia by Mr. Bridges to Henderson in London, who distributed the first plants in 1849. Of erect habit. Flowers large, bright cinnabar-red (Bot. Mag. *tab. 4483.* 1849)

B. Clarkei (Bolivia and Peru) was named in honor of Major Trevor Clarke, who received this species from Henderson and grew it for several years before flowering it. Introduced to gardens around 1867. Stems branching, flowers deep rose-red. (Bot. Mag. *tab. 5675.* 1867)

B. crinita (Peru or Bolivia) was first collected by R. Pearce on his travels through the Andes. Introduced by Veitch & Son, 1866. Plants erect and branching. Stems and branches red, leaves green, obliquely ovate. Flowers rosy pink. (Bot. Mag. *tab. 5897.* 1871)

**B. Davisii* (Peru) was introduced by Veitch & Son who received it from Walter Davis, collector for that firm. He found it at an elevation of 10,000 feet near Chorpe, Peru. It is a compact plant with broad-ovate, dark green foliage and bright orange-scarlet flowers. First bloomed for Veitch in 1876. Used extensively for hybridizing by John Seden. (Bot. Mag. *tab. 6252.* 1876)

**B. Froebelii* (Ecuador) came into cultivation through B. Roezl, who discovered it in 1872 in the high plateaus of the Ecuadorian Andes at 8,000 to 10,000 feet elevation. He collected tubers there for Froebel & Co. in southern Switzerland, for whom it bloomed in 1874, bearing bright crimson flowers on short erect stems and green heart-shaped leaves with long petioles. This species was not used to any great extent for hybridization. Gartenflora. *tab. 1.* 1876)

**B. fulgens* (Bolivia) was found in the mountains of Bolivia near the Peruvian border, in company with *B. Baumanni,* not far from where *B. Davisii* is native. Introduced to gardens by Lemoine & Son of France in 1893. Plants dwarf, compact, spreading, with brilliant red flowers.

**B. gracilis* (Mexico), which was described in 1825 in Humboldt & Bonpland, Nova Genera et Species Plantarum, is one of the oldest tuberous species known. Stems thin, erect, sparsely branching with small green leaves; flowers pink. Tiny bulbils form in the axils of the leaves. Introduced to cultivation in Edinburgh in 1829.

B. macra (New Granada) is a species with few leaves and flowers. Tubers small. Flowers pink.

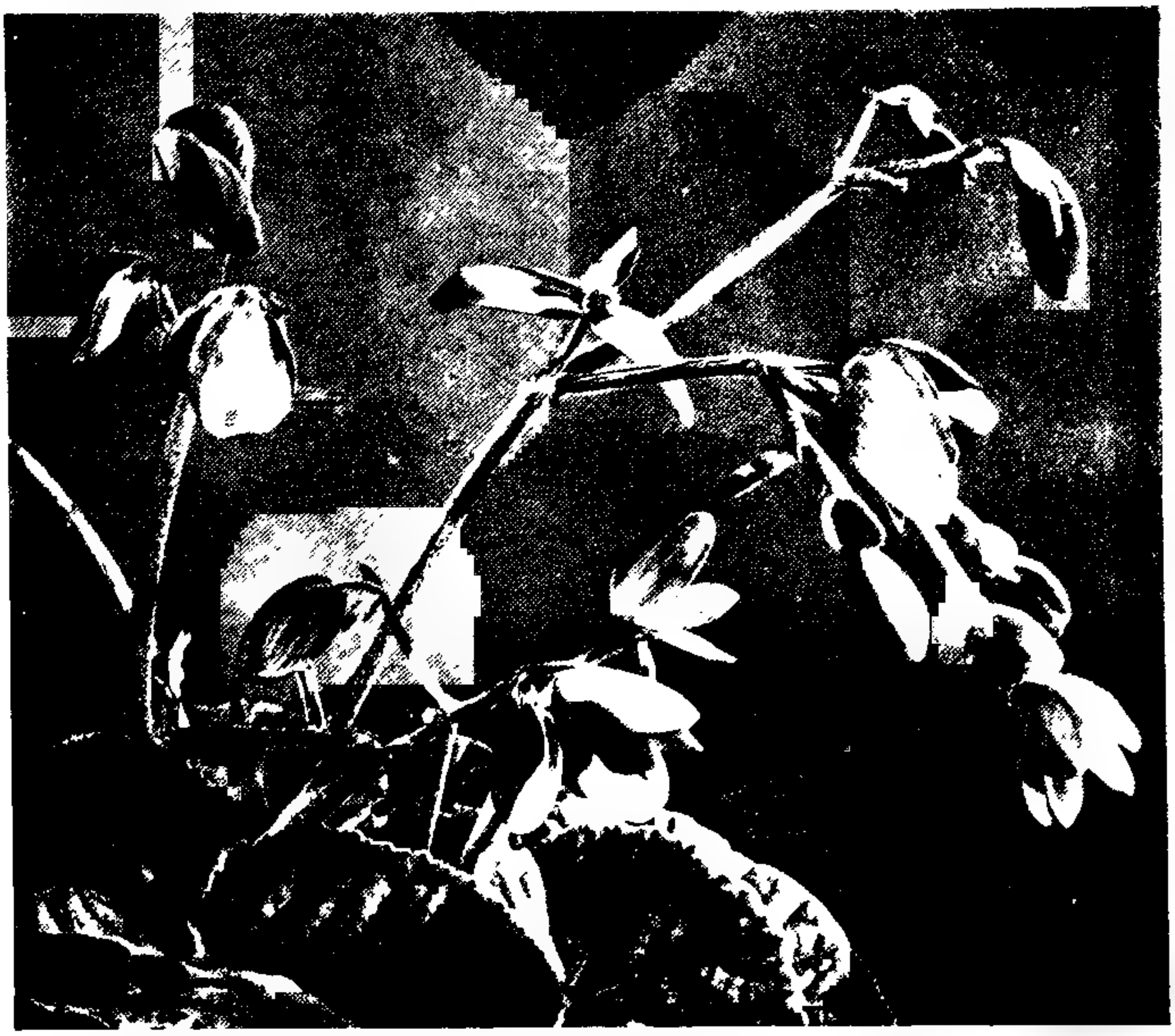
**B. Martiana* (Mexico) Tubers of this pink-flowered begonia were sent by Mr. Deppe from Mexico to the Botanic Garden in Berlin around 1828. Similar to *B. gracilis*, with which it is often confused. (Link & Otto, Icones Plantarum Rariorum *tab. 25.* 1828-31)

B. octopetala (Peru) was known in cultivation as far back as 1780. Live plants were brought to the Paris Botanic Garden by Dombey who collected them in the mountains near Lima. First described by L'Héritier in 1784. In 1835 tubers of this plant were sent to the Botanic Garden in Glasgow from Lima, Peru, by John McLean. There they bloomed the following year, bearing large white anemone-like flowers with usually 8 petals. It is a stemless variety, leaves and flowers arising directly from the tuber. Lemoine developed new hybrids from this begonia by crossing it with various other tuberous varieties.

B. Palmeri (Mexico) was among a number of plants collected by Dr. Edward Palmer in 1885 in southwestern Chihuahua, Mexico. He found it at Hacienda San Miguel a mile from the mining town of Batopilas at an altitude of 2,400 feet.

**B. Pearcei* (Bolivia) was the first yellow-flowered begonia found and was named in honor of Richard Pearce, who discovered it in La Paz. Introduced to gardens in 1866 through Veitch & Son. Largely responsible for the origin of yellow and yellow tones, which had previously been absent from tuberous begonias. (Bot. Mag. *tab. 5545.* 1865)

B. polypetala (Peru) was introduced by Froebel & Co. of Zurich in 1878. In size and shape the flowers of this plant resemble those of *B. octopetala* but are red instead of white. Some lovely varieties have



Begonia Froebelii, a crimson-flowered tuberous species being grown at the Botanical Garden.

been obtained by Froebel, who crossed this begonia with improved forms of *B. octopetala.*

B. rosaeflora (Peru) was procured by Richard Pearce, who collected tubers for Veitch & Son. He came upon this begonia in the Andes at an altitude of 12,000 feet. The plants are stemless; leaves green, reniform, with deeply impressed veins. The flowers vary in shades of rose-red. John Seden made free use of this species, which has probably been one of the most prolific plants in the production of tuberous garden hybrids. Introduced to gardens in 1867. By crossing light-colored forms the first white-flowered tuberous hybrid was obtained and distributed under the name ***Queen of the Whites.*** Some years later a white-flowered form was found in the wild by Walter Davis, which was considered identical with ***Queen of the Whites.*** (Bot. Mag. *tab. 5680.* 1867)

B. rubricaulis (Peru?) presents considerable doubt as to its native habitat and its introduction to cultivation. Klotzch says it bloomed first

in 1837 in the Botanic Garden in Glasgow where it had been received from Cammeron of Birmingham without description. The plant illustrated in the Bot. Mag in 1844 (*tab. 4131*) was received at Kew from the Curator of the Birmingham Botanic Garden, also without information. It is stemless, with leaves and inflorescences appearing directly from the tuber. Leaves green, deeply cut, overlapping at base. Peduncles and pedicels deep red. Flowers large, rose and white.

B. unifolia (Mexico), a most curious begonia, produces only one sessile, rounded leaf with a deeply cut sinus through which a few-flowered inflorescence arises. The leaf lies flat on the ground, the basal lobes overlapping. Its native habitat is the mountains of the State of Guerrero in the Iguala canyon where it grows on dry calcareous slopes and ledges and in rock crevices. Dr. William Trelease, then of the Missouri Botanic Garden, found it there in 1904. Herbarium specimens of *B. unifolia* had been collected two years previously in the same locality by C. G. Pringle. (Rep. Missouri Bot. Gard. 1904)

B. Veitchii (Peru) is another of Richard Pearce's discoveries. He found plants near Cuzco at an elevation of 12,000 to 12,500 feet, in 1866. Bloomed the following year for Veitch & Son. Stems short and thick, leaves deep green. Flowers large, vermilion. (Bot. Mag. *tab. 5663.* 1867)

B. Weddelliana (Bolivia) comes from the province of Jungas at 6,000 feet elevation. A small plant with red flowers.

Plant Novelties From Mexico

A Collaborator's Work Provides New Decorative Subjects For the Enrichment of Horticulture

By T. H. Everett

DURING the past several years the greenhouse collections at the Garden have been considerably enriched as a result of the activities in Mexico of Mr. Thomas MacDougall of New York City. As a collaborator of The New York Botanical Garden, he has sent or brought seeds or plants of many worth-while subjects which now find a permanent place in our displays and which, in many instances, will eventually enjoy a deservedly wider distribution throughout the country. The material collected by Mr. MacDougall includes numerous succulents as well as several begonias and other plants of a definitely decorative character. Not all of these have yet been identified but the work of making determinations receives constant attention and the results are reflected on the plant labels.

Begonia Liebmanni, which was exhibited by the Garden at the last International Flower Show.

Begonia Liebmanni

In March of the present year an unnamed begonia exhibited by the Garden at the International Flower Show received considerable publicity. It differed markedly in appearance from any begonia known to be in cultivation and was thought to be an entirely new species. The plant was raised from a piece of rhizome collected by Mr. MacDougall in January, 1938. He found it growing at an estimated altitude of 6,000 to 7,000 feet on the south slope of Volcan Tacaná between the villages of Talquian and Chiquihuites in the State of Chiapas. Subsequent investigation has proved this plant to be *Begonia Liebmanni*, a species described in 1864 but which so far as the records show has never before been in cultivation. In our greenhouses this plant is now being propagated with the intention of making it available later to members of the Garden.

Begonia Liebmanni has partly buried rhizomes which are crowded together and are furnished with short hairs. The leaves, which stand erect, have white-pilose green or pinkish petioles, up to 7 inches long, and blades which are orbicular, measure to 6 inches across, and have five or six prominent lobes of irregular size. The main lobes are sometimes again shallowly lobed and the margins have repand teeth. At

the sinus the basal lobes overlap. Above, the blade is sparsely pilose and green with a few irregular silver areas along the veins; the under surface is lightly purple-tinged, the veins distinctly pilose.

Equaling the foliage in height, the numerous inflorescences have terete, green, pilose peduncles and short branches. Each inflorescence has five or six flowers which at first are pale green but which at maturity are pure white within and greenish on the outside. The staminate flowers measure more than 1½ inches across and have four segments, the two outer large and ovate, the two inner narrow and obovate. The stamens are curved and are arranged in a bunch shaped like a hand of bananas with the shorter ones on the inside of the curve. Measuring about 1 inch in diameter, the pistillate flowers have two large reniform segments and one small segment which is elliptic or ovate. The two-branched style has fuzzy stigmas which are crescent-shaped The leaf green ovary has three shortly pilose, fleshy wings of the same color, one of which is broader and shorter than the others so that the ovary is distinctly unsymmetrical.

Begonia lobulata, bearing many hundreds of white or pinkish flowers.

Begonia lobulata

Although *Begonia lobulata* is listed as being in cultivation, plants received at the Garden both from American sources and from abroad have all proved to be wrongly identified and we did not have this species repre-

sented in our collections until plants were raised from seed sent in by Mr. MacDougall in 1935. This seed was found at Tehuantepec. In the following year he again collected seed of this species in a garden in Comitán, Chiapas, though he commented that almost certainly the plants had been brought there from the wild. Other seed numbers from the same collector have proved to be of this same species.

An unidentified species of Begonia, among the plants raised at the Garden from Mr. MacDougall's collections.

Begonia lobulata is a handsome, vigorous, tall-growing plant requiring some support. The many stems are erect, semi-succulent, and sparsely branched and on the younger portions have a brown tomentum as also have the 6-inch-long petioles. The leaf-blades are obliquely broad-ovate, shallowly 5- to 7-lobed and measure to 9½ inches long by two-thirds as wide. They are glabrous above except for a few hairs on the veins and rich green with usually small red areas at the point of attachment and at the main forks of the veins. Beneath they are paler and evenly brown-tomentose. The margins are red, finely toothed, and ciliate. The inflorescences are decorative, each consisting of 200 or more white or delicate pink flowers and measuring to 8 inches across. Almost equaling their subtending leaves the peduncles at first are erect but droop as the flowers develop. The branches of the inflorescence are pink. The flowers are dipetalous, the staminate more than 1 inch in diameter and the pistillate somewhat smaller. The petals of the former are ovate, those of the latter are obovate. The ovary is about ⅜ of an inch long and has one prominent rounded wing which in breadth equals the length of the petal and two much narrower, rounded wings.

Quamoclit lobata

The plant which many botanists now know as *Quamoclit lobata* is better known in literature as *Mina lobata*. Specimens which commenced blooming in November of the present year in the Tropical Flower Garden were raised from seed collected by Mr. MacDougall at Motozintla and sown in the greenhouse in April of this year. They were grown throughout the season in pots and by blooming time formed handsome specimens six feet high and completely hiding the stakes which afforded them support. At this writing (late November) they give every evidence that they will continue to be attractive for many weeks to come.

According to various writers this relative of the morning glories is much cultivated in Mexico. It is known by the name "bandera española" or Spanish flag. *Quamoclit lobata* was first grown in Europe in 1841. The plant perished after blooming without setting fertile seed and seemingly was not grown again in Europe for nearly half a century. About 1886 Haage & Schmidt of Erfurt, Germany, reintroduced it and we find a reference in the Gardeners' Chronicle for that year (vol. 26, p. 684). In 1899 it was figured in the *Botanical Magazine* (*plate 7689*), and *Addisonia* for 1916 (*plate 11*) depicts material from a plant which bloomed at The New York Botanical Garden in November 1915. There seems to be some difference of opinion as to the duration of this vine. Many writers refer to it as an annual while others class it as perennial. Our plants show every evidence of forming perennial stems but it may well be that in gardens it is better treated as an annual.

Quamoclit lobata is a tall-growing twining vine with green, heart-shaped, thin textured, usually tri-lobed leaves and petioles somewhat shorter than the blades, which on our plants measure to 5 inches long by nearly as broad. The inflorescences are arching, many-flowered, forked racemes to 7 inches or more long. Buds and flowers are tubular, slightly curved, prominently ridged, and narrowed toward the apex. The buds are bright red but as they age they assume a creamy hue, deepening to yellow toward the base. Stamens and stigma are protruded at maturity. The pleasing combination of red buds and yellow flowers in the same inflorescence forms a happy contrast with the rich green of the foliage, and the beauty of the plant is increased by the fact that the flowers remain attractive for a long time.

Quamocht lobata, an attractive Mexican climber with red buds and yellow flowers in the same cluster.

Dalechampia scandens, an unusual member of the Euphorbia family, in a form with ivory-colored bracts.

Dalechampia scandens

A curious member of the Euphorbiaceae is *Dalechampia scandens,* with a distribution extending throughout the West Indies, southern and western Mexico, and South America except in Chile and the Argentine.

Plants raised from seed collected by Mr. MacDougall at Guiengola at an altitude of 3,000 to 4,000 feet and sown during the spring of 1939 provided the first specimens cultivated at the Garden and possibly the first raised outside of the plant's native habitat. The standard horticultural reference books make no mention of this Dalechampia, nor have I succeeded in locating any pictorial representation of the species other than some based on wild material collected in the West Indies and published by Jacquin during the latter part of the eighteenth century.

Dalechampia scandens is a twining woody vine. The entire plant is softly pilose; the leaf-blades are deeply tri-lobed and about equal the petioles in length. On our plants blade and petiole together measure about 6½ inches in length but on older specimens this measurement would probably be increased. The leaves are green, the margins serrated. At the basal sinus are two short erect horn-like appendages. Our

Tradescantia Warscewicziana, a novelty which gives promise as a satisfactory house plant.

plants bear inflorescences which are attractive by reason of a pair of large tri-lobed bracts which subtend the flowers, and which close at night. In outline these bracts are orbicular-ovate and they measure to 1½ inches across. They are creamy-white, tipped green at the points of the lobes, which extend to nearly half the length of the bracts. The true flowers, like those of the Christmas poinsettia, are small and are arranged in a cluster at the center of the inflorescence. They are rich green in color and afford a striking contrast to the creamy bracts. Jacquin's illustration shows a plant with leaf-green bracts. Reference to herbarium specimens indicates that in nature most plants are of this coloring, and Dr. H. A. Gleason, who knows the plant in the wild, has met only the green form. This is much less attractive than our plants with cream-colored bracts.

Tradescantia Warscewicziana

Many visitors upon first seeing *Tradescantia Warscewicziana* in bloom refuse to believe that it is closely related to the trailing species which are more commonly grown, yet botanists assure us that it rightly belongs in the same genus. It is one of the most handsome and satisfactory of pot plants for greenhouse culture and should also have great possibilities as a house plant. It is now being propagated at the Garden and as soon as a sufficient supply is secured plants will be offered to members. The original stock of our plants was collected at San Cristóbal, Chiapas, by Mr. MacDougall and was received here in the spring of 1936. Although it has been in cultivation in the past, the latest edition of the Plant Buyers Index lists no available source of supply.

Tradescantia Warscewicziana has a stout erect stem which in old plants is branched. When young this species forms symmetrical specimens which are readily accommodated in five inch pots and attain a height (when out of bloom) of a foot or less during the first season. The leaves are fleshy, smooth, and light green. They are to 8 inches long by 2¼ inches wide and at the base they clasp the stem. The lower leaves bend downward, those above spread in an upward direction. The flowering season is from December on through the winter and spring. From the center of each plant arises to a height of 18 to 24 inches a stout, tapering, smooth scape, the upper portion of which is branched, the branches furnished with numerous rosy-lavender flower buds. Both in the bud stage and when open the flowers are very attractive. Only a few mature at one time and when expanded they exhibit their deep crimson-purple petals, bright yellow anthers and the protruding white filiform style. The long-triangular bracts are green and purple striped and stem-clasping. As the plant passes out of bloom young plantlets are formed in the axils of the inflorescence branches and these provide a ready and simple means of propagation. *Tradescantia Warscewicziana* will be illustrated in color in the next issue of *Addisonia*.

* * *

Courses for Gardeners

The new term in both the Science Course for Professional Gardeners and the Course in Practical Gardening will begin immediately after the first of the year in the Museum Building.

In the Practical Course there will be a series of twelve lectures on Outdoor Gardening, to be given by P. J. McKenna of the gardening staff. New students will be admitted for this second term of work, registration taking place at 7 p.m., Thursday, January 4. Those who complete the winter term successfully will be eligible to enroll in the laboratory session to be offered in the spring.

Gardeners in the Science Course will commence their new term on Monday evening, Jan. 8. Dr. W. H. Camp will teach a class in Plant Physiology beginning at 7:45 p.m. and Dr. H. N. Moldenke will continue the work in Systematic Botany at 8:50 p.m. each Monday evening. New students may apply only for the class in Plant Physiology.

Reviews of Recent Books

(All publications reviewed here may be consulted in the Library of The New York Botanical Garden.)

A Book That Lives Up To Its Title

AMERICA'S GARDEN BOOK. Louise Bush-Brown and James Bush-Brown. 1,191 pages, 150 illustrations, which include half-tones, sketches, diagrams, maps, plans and photographs—some in color; indexed Scribner, New York, 1939. $3.50.

This very minute, the following request has come over the phone: "My children have bought a farm and they want to know everything at once. What book shall I buy for them?"

The answer is "America's Garden Book" by Louise and James Bush-Brown. It will solve all their garden problems for years to come, for the book truly lives up to its title. It takes up one garden question after another and deals with it clearly and adequately, as we might expect from a book written by the Director of the Ambler School of Horticulture and a member of its faculty. Soil, garden design, all sorts of construction problems, lawns, ground covers, vines, bulbs, hedges, trees and shrubs, annuals, biennials, and perennials are all treated in turn. And that is not all. We had to start a new sentence. There are chapters on rock and wall gardens, water and bog gardens, wild gardens, herb gardens, fruit and vegetable and city gardens, coldframes, hotbeds and greenhouses. Roses, lilies, house plants, feeding, pruning, plant diseases and pests, tools, various types of propagation — all these and many other subjects are set forth in useful detail. Even the culture of plants in nutrient solution has its place in the book; very properly, because some of the most interesting experiments of this modern method have been carried out at Ambler.

The number of subjects adequately treated is so great that one finds oneself speculating on possible omissions. Only three can be produced: hybridization, color planning in the garden, and weed control, which is not discussed except in its relation to lawns. One is not complaining, mind you (one has one's money's worth). This is merely curiosity, trying to find out if anything really has been omitted. The zone charts of frost dates, the plans and the glossary are further practical aids. The actual material weight of the book is troublesome. A different format, perhaps a different paper, or dividing the material into two volumes would be more pleasing and convenient. Nothing however could make this other than a fine, helpful book — a really important book.

EMMA E. THACHER,
Horticultural Chairman,
Garden Club of America.

A College Textbook of Botany

TEXTBOOK OF GENERAL BOTANY. Richard M. Holman and Wilfred W. Robbins. Fourth Edition. 664 pages, 482 figures. Wiley, New York, 1938. $4.

The fourth edition of a college textbook in botany testifies as to its worth in the classroom. As in previous editions the text material is concise and the arrangement permits flexibility in teaching. The chapters on absorption and conduction have been rewritten to coincide with recent developments in plant physiology. The plant hormones in relation to growth phenomena have been included. Other minor changes have been incorporated which further increase the usefulness of the volume. The glossary added to this edition is a point well taken by students.

While this text is admirable in scope it would seem desirable to incorporate additional material on the chapter dealing with the flower. The subject of mosses might be curtailed. For after all, many students have but one course in botany and flowers will be under observation more frequently than mosses. Yet the alert teacher can supply this need by way of example in this as in economic products.

Not only is this an excellent book for the college student but for the garden

lover as well, since it supplants the practical with the basic scientific facts that seem indicated in the field of gardening The text figures are excellent and well chosen to illustrate the salient features of the book

WILLIAM J. BONISTEEL,
Fordham University.

The Smokies in Photographs

VALHALLA IN THE SMOKIES. Phillip Herbert Maxwell and Edouard Evartt Exline. Full page photographic illustrations with accompanying legends. George A. Exline, Cleveland, 1938. $5.

Although not essentially botanical in nature, this volume on the Great Smokies should stimulate further interest in a region whose greatest asset is the nature and abundance of its flora. The ample legends, as well as the excellent photographs, reveal the history and spirit of the peoples who have inhabited this area. Many of the illustrations emphasize the important role of the plants in creating the beauty and picturesqueness of the landscape.

A. J. SHARP,
University of Tennessee.

Monument To The Lily Family

HARDY BULBS, including Half-hardy Bulbs and Tuberous and Fibrous-rooted Plants. Vol. 3. Liliaceae. Charles Hervey Grey. 664 pages; glossary. Illustrated by Cecily Grey E. P. Dutton & Co., 1938. $11.

In the introduction to this, the third of his great volumes on hardy bulbs, Lt.-Col. Grey admits that he thinks his classification of the Liliaceae will not be permanent because it does not follow Dr. Hutchinson's reclassification in his "Families of Flowering Plants" (Monocotyledons, 1934). He thinks well of the reclassification but does not follow it — just why, I do not understand. Though he calls the Liliaceae "a most unharmonious and unwieldy Family" he leaves the *Agapanthus* and *Allium* species here instead of transferring them to the Amaryllidaceae, where most people place them today, and he leaves the *Hypoxis* and *Alstroemeria* groups with the Amaryllids.

Also he omits entirely the important Aloes and Haworthias (he spells the last *Hawarthia*) for the reason, he says, that he "has no personal knowledge of the genera and mistrusts their fat, fleshy leaves!" Perhaps he will give a volume to them later but they seem pretty large and important groups to be lacking in so comprehensive a work as his, with its three volumes covering bulbous plants and their allies. He says also that they are "unsuitable for general cultivation, whether in the open or in a cool house in Great Britain." If that is true in Great Britain, it is certainly not so in the United States, for California grows an abundance of them and many of them do well in our northeastern houses and cool greenhouses.

Having looked forward eagerly to the publication of this work, I have to admit that, with all its virtues, I was a little bit disappointed in it. Lt.-Col. Grey has done so much in growing these plants from all over the world that I had expected much more in the way of cultural directions than I found. He gives, of course, many suggestions through the three volumes but I find many of them just a little sketchy. I suppose, "It is an attractive plant for a pan in the alpine house," or, "This beautiful plant flowers in April and is easily grown in stony, fir-needle peat and loam in partial shade," are all that a plant expert would ask in the way of cultural directions, but amateurs need a little more. What proportion of peat? What proportion of loam? etc.

I do not find the illustrations altogether satisfying. *Ornithogalum aureum,* the golden chinkerinchee, (I am glad he rates it as a separate species and not just a variety of *O. thyrsoides*) is a handsome plant, its spikes of golden orange blossoms most striking. Though he says the flowers number 8 to 12, the illustration shows two rather sickly-looking stems with only 4 or 5 flowers and buds on each. Also, neither with this flower nor with *O. thyrsoides*, does he mention their great merit for florists and others: that the flowers last for many weeks, so that stalks of the white species, cut in South Africa and shipped here and to England, last four weeks or more after arrival.

After all that may be said in fault-finding, the fact remains, however, that this is a splendid work. Faults could be found in any such work, but the years of patient experiments with innumerable kinds of liliaceous plants have resulted in a publication of great value. The large

numbers of species brought together (and notwithstanding certain omissions) will help growers all over the world in identifying their plants. The lists suggest endless possibilities, especially to the increasing numbers of people who want to work with plants of one genus. It would be exciting to grow as many Kniphofias (red hot pokers) as one could get (and here one finds 23 pages of them), or fritillaries (with 42 pages) or hyacinths (14 pages). The fact that seeds or bulbs of many would be difficult to obtain would only whet one's appetite. So whatever my criticisms may be, they do not alter the fact that I consider this three-volume work an extremely valuable contribution to horticulture.

SARAH V. COOMBS.

A Drug Problem

MARIHUANA. Robert P. Walton, 223 pages, indexed and with an extensive bibliography. Lippincott, New York, 1938. $3.

That the smoking of Marihuana (the Mexican name for Oriental hashish, derived from the hemp plant, *Cannabis sativa*) has become increasingly and alarmingly common among both adults and school children in the United States is well known. We are therefore indebted to Professor Walton for his definitive study of the history of the drug, as well as its clinical manifestation and psychiatric implications.

W. H. CAMP.

On Plant Culture Without Soil

CHEMICAL GARDENING FOR THE AMATEUR. C. H. Connors and V. A. Tiedjens. 255 pages, illustrated, indexed. Wm. H. Wise and Co., New York, 1939. $1.95.

This is a good book for anyone interested in chemiculture, tank culture, water, sand or gravel culture. There is a delightful chapter on the art of growing plants, which every gardener should read, and plenty of information on the various aspects of plant nutrition, a knowledge of which is useful whether soil, sand, gravel or water is the medium in which the plant is grown.

W. J ROBBINS.

Java's Five Hundred Ferns

VARENFLORA VOOR JAVA. C. A. Backer and O. Posthumus. Pages i—xlvii, 1-370, illustrated with 81 figures and map, indexed and bibliography. Van's Lands Plantentuin, Buitenzorg, Java, 1939. f.7.50.

The publication of a fern-flora of Java will be welcomed by students of the group, and the present treatment is especially valuable because of the long experience of its authors and the care with which the work is presented. Although written in Dutch, the book is for the most part intelligible to readers who are acquainted with English or German fern terminology. The excellent text figures help to give a picture of each genus, and for this reason the work should be useful to those interested in the cultivation of Malayan ferns.

For its size, Java must be ranked among the richest parts of the world in ferns, possessing, according to this treatment, 15 families, 104 genera, and 515 species. After introductory notes on morphology and terminology, the authors present keys to the families and genera, followed by elaborate descriptions of each species. These descriptions are presented in the form of extended keys, a method which has much to recommend it. Herbarium students may regret the lack of full synonymy and citations, but this would scarcely have been possible without greatly enlarging the book. A concluding section dealing with geographic distribution and ecology will be of more general interest to botanists who are not fern specialists.

A. C. SMITH.

An Illustrated Garden Book At a New Low Price

THE GARDEN IN COLOR. Louise Beebe Wilder. 327 pages, illustrated with 320 colored plates, indexed. Macmillan, New York. $2.95.

It is gratifying to be able to announce Louise Beebe Wilder's last book (1937) at a price which will give many more readers an opportunity to appreciate her fine writing on gardening subjects.

The Garden in Color, which consists of colored plates from Germany's leading horticultural magazine, *Gartenschönheit*, with an accompanying text for each prepared by Mrs. Wilder, is not done in this author's accustomed manner. For

Mrs. Wilder always took pains to write about the plants which she grew in her own garden. Her style is there, however, when she comes to plants of close acquaintance, and her background of long years of growing things, observing them closely, and writing about them with fore thought and wisdom, can not be suppressed.

To one who has been familiar with these same colored plates in *Gartenschönheit,* the reproductions here are disappointing. Colors are often muddy and seldom as accurate as the originals. While they are useful in providing occasion for the text, it is Mrs. Wilder's information about each subject which gives the book its value. The original price of it was $7.50.

CAROL H. WOODWARD.

Garden Flowers

WHERE DID YOUR GARDEN GROW? Jannette May Lucas. Illustrations by Helene Carter. 65 pages, indexed. Lippincott, Philadelphia, 1939 $2.

Young people who have gardens of their own should enjoy the stories about the continental origins of some of the flowers they grow, as presented by Jannette May Lucas. The book is illustrated in the now familiar style of Helene Carter, who superimposes the subjects being discussed upon a colored map to show the region from which they came.

CAROL H. WOODWARD.

Tropical Tale of a City Man

THE ORCHID HUNTERS. A Jungle Adventure. Norman MacDonald. 294 pages, illustrated with photographs. Farrar & Rinehart, New York, 1939. $2.75.

The Orchid Hunters is a tale of two intrepid young men who having found life in office and workshop dull and tame decided to journey afar into the jungle in search of the elusive orchid. The book, written by Norman MacDonald, one of the party, is an account of their amazing adventures in those remote regions so seldom visited by man.

One could hardly term the work an example of classical literature. However, the story is interestingly told. The regions and the natives and their modes of living are graphically described and their adventures vividly portrayed. It is indeed a tale of courage, enterprise, and endurance and through it all there weaves a fine thread of genuine humor that lends to the story a freshness and buoyancy, a humor that undoubtedly sustained them on many a discouraging occasion.

It is a book that will fill many moments with interest and not incidently a little education.

P. J. MCKENNA.

Current Literature At a Glance*

By Virgene Kavanagh

In the City. "Plant Propagation in the Classroom" issued by the School Nature League in October, suggests plants which might also be encouraged to grow in city apartments and describes simple and inexpensive ways to start them from seed and cuttings.

Polypores. "Pore Fungi of Western Pennsylvania" by LeRoy K. Henry is an illustrated, nontechnical guide to twenty common polypores with a key and a bibliography, issued as Botany Pamphlet No. 2, Carnegie Museum, Pittsburgh, Pa.

Weeds and Flowers. The weeds of South Africa are often the highly prized flowers of the rest of the world, so a publication on this subject by E. P. Phillips of Pretoria is welcome even in a distant country. Illustrated with drawings of 148 of the species described, it is intended to help the South African farmer know what to plow under or to pull up, but it serves incidentally as a guide to gardeners elsewhere.

West Virginia. "Spring Wild Flowers of West Virginia" by Earl L. Core is a mimeographed booklet with popular descriptions and pictures of some of the common wild flowers. It has been made available for use as a 4-H Club manual.

Floral Genetics. In *Genetica* for October, Tames and Groenveld-Huisman describe some of the flowers obtained in fifteen years of growing *Dahlia variabilis,* a species which varies greatly in the color and character of the ray florets. They have studied the genetics of the white florets among colored ones and especially of the vermilion-edged floret.

* All publications mentioned here—and many others—may be found in the Library of The Botanical Garden, in the Museum Building.

In the same number, Honing discusses two anthocyanin factors in the canna, one dominant, the other recessive to pure yellow. He had obtained plants from seed of a Bolivian canna to use in his crosses with the Montevideo and Java races. The Montevideo and Java plants contained lethals from which the Bolivia plant was free, and it was possible to get new lines free from the lethals and homozygous for colors that had not been available before.

Rhododendrons. All the steps, from the construction of the propagating frames to setting out the young plants, seem to be included in "Rhododendrons from Cuttings," published by the New Jersey Agri. Exper. Sta., as Bulletin 666, 1939. Species and varieties which are easier to root than others are shown in tables, sometimes with rooting percentages. The same techinique and equipment can be applied when propagating large quantities of other plants.

New South Wales. Journals like "The Tree Lover" and "The Junior Tree Warden", from New South Wales make us realize that ours is not the only land with beautiful forests and serious conservation problems. Tree planting is made part of the educational program for the children there and each child is encouraged to be a tree warden.

Herb Annual. The current issue of "The Herbarist," which is published annually in Boston by the Herb Society of America, is packed with interesting articles which are easy to read. Snuff, ephedra and ephedrine, indigo, woad, and colchicine are among the subjects presented there by experts.

Wax for Vegetables. How carrots and cucumbers in the market are benefited by waxing is told in a recent bulletin (No. 723) entitled "Wax Emulsions for Vegetables," published by the Cornell Agri. Exper. Sta. Asparagus, summer and winter squash, pumpkins, husked sweet corn, eggplants, peppers, and tomatoes also are improved, but leafy vegetables are harmed by waxing. The cost of waxing is about 3 to 4 cents per bushel.

Hedge Plants. How to select a place for a hedge, what plants to choose, how to set them out, how to train and prune the hedge, and cultivate and fertilize, are explained by N. R. Elliott in Circular 337 of the Kentucky College of Agriculture. Brief descriptions of some of the plants most suitable for hedges, with notes on their soil and light requirements, are included. Some of the less usual plants suggested for hedges are the broadleaf fragrant honeysuckle (*Lonicera fragrantissima*), mockorange, flowering quince, winged euonymus, hydrangea, Hugonis rose, highbush cranberry (*Viburnum Opulus*), hemlock, and dwarf euonymus.

Notes, News, and Comment

Binding of Journals. The firm of Dess & Talan, which handles the binding of books for the library of The New York Botanical Garden, has kindly offered again, as a service to Garden members and Journal subscribers, to bind the year's file of the Journal for one dollar plus postage.

The binding will be of the highest standard, good quality boards covered in full green cloth, lettered in genuine gold. The entire set should be firmly wrapped in corrugated boards and mailed directly to Dess & Talan, 217 East 144th St., New York City. The work will be promptly done and a bill will be sent before the bound volume is returned to the owner.

Under the same arrangement, volumes of *Addisonia* (four numbers) will be bound for $1.60 plus postage.

Board Member. Dr. A. Percy Saunders, recently retired Professor of Chemistry at Hamilton College, Clinton, N. Y., was elected to the Board of Managers of The New York Botanical Garden at a meeting Dec. 7. He succeeds the late Raymond H. Torrey. In his Hamilton post since 1900 and dean of the college during fifteen years of that period, he has, in the meantime, shown a marked interest in horticulture and botany. Besides his affiliation with the American Association for the Advancement of Science and the Chemical Society, he is a director both of the Peony and the Iris Societies of America and a fellow of the Royal Horticultural Society in London.

Torrey Club. Dr. B. O. Dodge addressed the Torrey Botanical Club Nov. 6 at the American Museum of Natural History on Mendelian inheritance in the fungi.

Speaker. P. J. van Melle of Poughkeepsie, N. Y., addressed the Saturday afternoon audience at the Garden Nov. 4, speaking on "Success with Azalea and Rhododendron." The subject had originally been chosen by P. M Koster of Huntington, Long Island, who was ill at the time.

Gardener. Nicholas Pecora, who had been working as assistant to Dr. B. O. Dodge since graduating from the Science Course last April, left the Garden to become a gardener at La Guardia Airport at North Beach, Long Island, Dec. 1. He entered the services of the Garden in May 1937 as an apprentice and was made a student gardener in July of that year.

Visitors. Dr. M. Demerec and Dr. B. P. Kaufman, geneticists at the Carnegie Institution at Cold Spring Harbor, visited the Garden Dec. 2 with Dr. Alexander Hollaender, biochemist with the National Institute of Health, to consult with Dr. B. O. Dodge regarding fungous material for experiments on the genetic and physiological effects of ultra-violet light.

Dr. E. J. Schreiner, who came to the Garden in late November, accompanied Dr. A. B. Stout on a trip to Strathglass Farm near Port Chester to survey the poplar breeding work in which they are co-operating.

Edwin Osgood Grover, Vice-president of Rollins College, came to The New York Botanical Garden Nov. 7 on a mission for the Mead Botanical Garden in Winter Park, Florida, of which he is President. This new project, which it is expected will be opened to the public the first of the year, is a 55-acre tract of land within the city, being developed in memory of Dr. Theodore L. Mead in recognition of his half-century of service to horticulture.

Carlos A. O'Donell, of the Instituto Miguel Lillo, Tucumán, Argentina, visited the Garden during November. He is spending a year in graduate study at Harvard University, specializing in the Convolvulaceae.

R. E. Wood, paleobotanist with the U. S. Geological Survey, spent a weekend at the Garden last month, studying in the herbarium.

Among other November visitors were M. L. Fernald and C. A. Weatherby of the Gray Herbarium, M. A. Chrysler of Rutgers University, Roland W. Brown of the U. S. National Museum, Arthur Bevan of the Tropical Forest Experiment Station in Rio Piedras, Puerto Rico, Frances J. Clark of the Connecticut Agricultural Experiment Station, and Jane Craighead of the Boyce Thompson Institute.

Conference. Summer and autumn botanical meetings attended by staff members were the subject of the November conference of the scientific staff and registered students Dr. A. C. Smith spoke on the June field meeting of the Botanical Society of America held in Virginia; Dr. Fred J. Seaver on the Mycological Foray in the Great Smoky Mountains in August; Dr. William J. Robbins and Dr. B. O. Dodge on the Third International Congress for Microbiology, held in New York in September; and Dr. A. B. Stout on botanical institutions in Europe and the Seventh International Congress of Genetics in Edinburgh.

Lectures. Addresses given recently by members of the staff include "Mushrooms of Forest and Field" before the Connecticut Horticultural Society and "Bermuda: Its Gardens and Scenery" before the Fairfield Garden Club, both by Dr. F. J. Seaver; "Arrow Poisons and Fish Poisons of the South American Indians" by Dr. A. C. Smith before the Association of Medical Directors in New York; and "Consider the Lilies of the Field" by Dr. H. N. Moldenke before the Watchung Nature Club.

Visiting Groups. Three groups totaling more than 150 students from the College of New Rochelle visited the Garden in mid-November in connection with their courses in botany. One group came especially to make some studies in plant ecology. On Nov. 17, 30 persons studying botany with the Soil Conservation Service of the W.P.A., under the U.S. Department of Agriculture, made a tour of the main conservatories.

Gourds. A collection of gourds, Indian corn, and peppers, which won a gold medal in "Gardens on Parade" just before the close of the World's Fair, has been on exhibit in the rotunda of the museum building at the Botanical Garden. The material was raised and exhibited by Miss Helen M. Tillinghast of Vernon, Conn.

INDEX TO VOLUME 40

Monthly features, such as Notes, News, and Comment and Current Literature at a Glance, will be found in the Table of Contents (page ii) but not in the index below. Such items as lists of visitors and lectures by staff members, also occurring regularly, are not listed here. Books reviewed are listed under the authors' names in a separate index beginning on page 301. In the general index, the abbreviation "(rvw)" after a person's name refers to a book review. The abbreviation "Sup." indicates the Supplement to the Journal, issued in April and containing annual reports and historical data, which was paged separately from the rest of the volume.

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REPORT OF THE DIRECTOR FOR 1938

THE activities of The New York Botanical Garden are so diverse that it is difficult to review within reasonable limits and yet with adequate detail the accomplishments of the past year. Many subjects which should be discussed in a report of this character have been omitted and others presented in condensed form.

During the past year distinct advance has been made in certain features of the material aspects of the Garden.

Buildings and Grounds

Under the supervision of Mr. A. J. Corbett, Superintendent, and Mr. A. C. Pfander, Assistant Superintendent of Buildings and Grounds, many improvements have been initiated or completed.

The reconstruction of the main conservatory at a total cost of approximately $350,000 was completed by the City giving us excellent facilities for indoor display and for the maintenance of a collection of exotic plants. The collections in some of the houses have already been installed, including the succulents in houses 6, 7, and 8, the ferns in house 11, and the tropical rainforest in house 12. It will require a year or more before the plantings in all the houses are completed and full advantage can be taken of this improvement in our facilities. The reconstruction of the cornice of the Museum and Administration Building has begun under a contract issued June 9th. This cornice had reached a condition which endangered employees and visitors and allowed leakage of precipitation into the building because of insecurity of some parts of the terra cotta. The repair of the cornice will cost approximately $50,000.

Work on modernizing the comfort stations for men and women in the basement of the Museum and Administration Building was begun Septem-

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ber 19th. These rest rooms have received little attention since the construction of the building some 40 years ago, and the rehabilitation now under way was badly needed. The expense of these repairs will approximate $8,000.

A laboratory for investigation of the importance and function of growth substances in plants was installed in the southeast corner of the basement of the Museum and Administration Building. The experimental apparatus for this laboratory was purchased on a grant of $7,500 received from the Rockefeller Foundation.

The lecture room in the Administration and Museum Building was improved by a minor change in the lighting system, the laying of floor runners to deaden noise, and the purchase of a new screen.

In accordance with an agreement between the Garden and the City an exchange has been effected whereby the Garden turns over to the Park Department approximately 120 acres of land on the north and east side for use as playgrounds and for general recreational purposes. In addition manure pits, a propagating house, cold frames, and other structures on this land will be abandoned by the Garden. The 280 acres remaining are to be fenced, and the Stables and Snuff Mill, originally part of the Lorillard estate, and the propagating houses, formerly used by the Park Department, together with the land immediately surrounding these structures, are allotted to the Garden. In addition gate houses, manure pits, and cold frames are to be constructed, and changes in paths and roadways within the Garden will be made as required by the fencing and modification of entrances and exits. I am pleased to report that the Stables, Snuff Mill, and propagating houses have been turned over to the Garden and that work has been initiated on the construction of the fence. I believe that these changes, which are proceeding through the interest and cooperation of the Park Department and under its supervision, will be of great importance for the future development of the Garden. A year or more will be necessary for the completion of this program, and much work will be placed on the Garden staff and considerable expense incurred in installation and changes of planting required under the new conditions.

In addition many minor items involved in maintenance of buildings and grounds were completed during the past year. These include enlarging the steam trench in the basement of the Museum and Administration Building, removal of steam coils and installation of traps in the main conservatory range, replacing of 72 feet of 8-inch steam pipe in Range 2, repairs to ventilators and glass in the propagating houses, repairs to drinking fountains, and the installation of water pipe to the dahlia border, installation

of drains in the old iris garden, raising the main sewer at Power House 1, and many other similar items. Some 14,000 linear feet of 10-foot paths were completed during the year, the work being done by the Works Progress Administration.

Living Plant Collections and Displays

Under the direction of Horticulturist T. H. Everett and with the able assistance of P. J. McKenna and others the living plant collections and displays have been extended and improved.

Outdoor Plantings. Despite somewhat unfavorable climatic conditions during the early part of the season and excessive heat during August, the outdoor flower displays have been uniformly good.

Summer displays of annuals and biennials involved the use of 34,350 plants set out from pots and flats in addition to many items sown *in situ*.

In preparation for a 1939 spring display 2,500 tulip bulbs have been planted in the Conservatory Court and 7,600 biennials raised.

The Iris Garden made a particularly fine display in May and early June. This garden was enlarged during the year by the addition of 600 plants of Bearded Iris in 15 varieties, 100 plants of Japanese Iris in 20 varieties, 220 plants of Siberian Iris in 40 varieties, 800 bulbous Iris in all varieties, and 150 plants representing 15 natural species.

The installation of land drains in the Rose Garden materially reduced winter killing. In all, less than 100 plants were lost last winter. Nevertheless, in order to improve the plantings and to maintain as fine a collection as possible 862 plants in 173 varieties were replanted last spring. Among these were 145 plants of 48 varieties of hybrid perpetuals, the collection of which now contains 107 varieties and is the most complete collection of this kind of rose in the United States.

Following the elimination of the old Dahlia Borders incident to the alienation of land to the City, new borders were established near the Iris Garden. The main planting is horseshoe-shaped and is located to show the Dahlias to good advantage against a background of spruce trees. Good staking and tying saved the Dahlias from destruction during the September hurricane. The Dahlia planting totaled 900 plants in 356 varieties. To assure this number 1,200 plants were raised, 700 of these from cuttings.

During the spring 2,700 plants of 66 varieties of Hardy Asters were propagated and set out from pots to form a border which created a good display during late September.

Beds and borders of well grown flowers surrounding the main conservatories are one of the features of the summer displays at The New York Botanical Garden.

The display of Hardy Chrysanthemums during 1938 was the best of recent years and attracted much favorable comment. Some 3,500 plants were used in the Chrysanthemum Border.

One-fourth of the Advisory Council Perennial Border has been completely renovated, following the usual practice of quadrennial planting.

Additions and replacements in the Thompson Memorial Rock Garden included the setting out of more than 1,300 plants propagated at the Garden and 450 received from other sources as well as the planting of approximately 5,000 bulbs of *Scilla, Chionodoxa, Galanthus, Crocus, Fritillaria, Tulipa, Colchicum, Allium, Eranthis,* and *Narcissus.* Species new to the Garden numbered 400. With the active cooperation of Assistant Curator E. J. Alexander the native flower area is being developed, and some 500 plants were added to the collection. Some 300 lilies and 150 other plants have been set out in a flowering meadow to the immediate south of the bog area in the Rock Garden.

Nearly 2,000 Cannas were propagated and planted near the Fordham Hospital Entrance.

The Perennial Border at the west end of Conservatory Range 1 has been maintained as usual.

The Hardy and Tropical Waterlilies provided satisfactory summer displays.

For the past several years the Narcissus plantings have been gradually deteriorating. Last summer the bulbs forming the major portion of the planting were lifted, the land was drained, dug, and fertilized and the bulbs replanted. Unfortunately, new bulbs were not available, and the old bulbs were small and of poor quality. It is somewhat doubtful whether these bulbs will increase in size sufficiently to insure satisfactory display, and in any event it will be two or three years before definite improvement can be expected.

The construction of the boundary fence necessitated the transplanting of 54 large conifers, 41 large deciduous shrubs and 93 medium-sized plants of *Ilex opaca.* Assistance from the Works Progress Administration was received for this work. In addition 113 large conifers were moved from the Cos Cob Estate of Col. Robert H. Montgomery into our collections. Trees and shrubs added to the permanent collections totaled 2,176 and included 23 genera and 225 species and varieties not at present represented in the Garden. In addition 1,950 ground cover plants were set out and 742 plants were transferred to a new nursery and 4,683 plants were set out in the nursery from beds and frames.

A considerable extension of the Arboretum is desirable. A beginning has been made, and the preparation of a planting plan is receiving attention.

The new accessions to our permanent plant collections during the year numbered 1,945. Labeling receives constant attention, but vandalism makes it difficult to maintain signs and labels in many parts of the Garden. In addition to many thousands of small record labels 2,550 show labels were made and installed.

Seeds totaling 4,819 packets were distributed to 282 botanical gardens and similar institutions throughout the world and to 38 private individuals. From the exchange lists of others 359 packets were requested and received. Seeds have been collected and a 1938–39 seed list of 489 items has been prepared.

Indoor Plantings. Reference has already been made to the plantings in the reconstructed Conservatory. So far as practicable, it is planned to eliminate the growing of specimens in individual pots or tubs and instead to plant them in ground beds in a naturalistic fashion. This arrangement does not detract from the scientific aspects of the collections, makes them more pleasing and provides better cultural conditions.

The continuous flower show initiated in 1932 but discontinued during the reconstruction of the conservatory has been reinstituted because of the popularity of this type of display. Two houses (Nos. 4 and 5) are now given over to this purpose, one being devoted to the exhibition of warm greenhouse plants, the other to the display of coolhouse material.

Range 2 is largely devoted to the production of decorative plants for Conservatory Range 1 and outdoor plantings and for housing the Orchid Collection, Begonia Collection, the South African bulbous material and some large temperate-house woody material.

Plant Diseases

Under the able supervision of the Plant Pathologist, Dr. B. O. Dodge, plant diseases and pests have been kept to a minimum. No new cases of infection of Dutch elm-disease and no egg clusters or caterpillars of gypsy moth were found during the past year. The prediction has been made that the Japanese beetle will increase in the Garden in spite of our efforts to control it because of the large acreage of lawns and golf links in the Bronx, which have not been treated with arsenate of lead. However, some condition, perhaps unfavorable weather during the season, reduced the number of adult beetles in the Garden in the summer of 1938. The number caught in traps (360,000) and picked by hand (60,000) was but two-thirds the number collected last year. Additional areas of the lawns have been treated with lead arsenate using 10 pounds per 1,000 square feet. The repellent, aluminum sulfate and hydrated lime, was used with good results.

Hardy chrysanthemums carry the season of outdoor flowers far into the autumn months. The Botanical Garden exhibits more than 70 named varieties in the special chrysanthemum borders every year.

Treatment of the Iris plantings with lead arsenate two years ago has largely eliminated soft rot and removal of diseased plants and sterilizing the soil with Semesan has controlled the rhizome rot caused by *Sclerotium Delphinii*.

Black spot and mildew were more serious in the Rose Garden than at any time in the past ten years, probably because of the rainy weather which prevailed during a good part of the season. Nevertheless, the roses were maintained in good condition by constant attention.

Chinch bugs appeared in several spots in the Garden and were controlled by one per cent nicotine tobacco-dust, using fifty pounds per thousand square feet.

Herbarium

A herbarium is in effect a reference library of correctly identified plants preserved in convenient and accessible form. A suitably organized herbarium, which is sufficiently extensive, serves competent botanists as a means of identifying unknown specimens quickly and accurately and in addition is the basis for research in the taxonomy, distribution, evolution, variation, and even on occasion the chemical composition and other properties of plants. The herbarium of The New York Botanical Garden serves in all these ways, and the more complete it is and the more efficiently and conveniently organized it is the more satisfactory it becomes as a source of information and as a research tool.

The herbarium of The New York Botanical Garden is the largest under one management in the United States, and one of the outstanding collections in the world. During the past year its permanent collections have been increased by 45,797 specimens bringing the contents of the herbarium to a total of 1,933,506. It contains one of the three major collections of fossil plants in the United States and is equal or superior to any collections in the world in plants from northern South America, the plants of southeastern Asia, plants of southeastern United States, in mosses, and in certain groups of the fungi. No accurate statement can be made of the monetary value of such a herbarium, since much of its contents could not be replaced. To develop a herbarium of similar size and representing the same regions would probably cost five hundred thousand dollars. To apply the same critical study to such plants as has been applied to the present herbarium and to make the study available in printed form would easily require a million dollars more.

Extraordinarily limited funds make it impossible for the herbarium to develop equally in all its branches or to secure material from all parts of the

world. While desirable material from every region is added as opportunity offers and funds are available, it is frequently necessary to limit the scope of its collections and the activities of its staff.

Among the numerous additions during the past year, which represent all six continents and all parts of the Americas, certain collections enumerated below are especially noteworthy.

The collections of Dr. A. C. Smith in southern British Guiana, 1,583 sheets, most of which were from regions never before visited by a botanist.

The collections of G. H. H. Tate from Mount Auyan-Tepui, Venezuela, of which only a part have as yet been accessioned. This mountain, never before ascended, is a part of the general system which includes Mount Roraima and Mount Duida. Although the collection made by Mr. Tate was necessarily small and incomplete, it contains many species new to science or hitherto not represented in our herbarium.

The Sturgis herbarium of Myxomycetes. Mr. W. C. Sturgis devoted many years to the study of this interesting group of minute plants, and accumulated a collection of 3,200 specimens, including many type specimens.

The Hagelstein herbarium of Myxomycetes presented to the Botanical Garden by Honorary Curator Robert Hagelstein. This collection of 4,800 specimens is remarkable for the abundance of material under each specimen and for the exceeding care with which they have been collected and preserved. These two collections, added to our already large representation, give us the largest and most representative collection of Myxomycetes in America.

Use of the Herbarium. The utilization of the herbarium for research and for general information to the public is unabated. Four general types of service may be distinguished.

1. *General and miscellaneous information to the public.* Numerous specimens, mostly fragments of cultivated plants, are submitted for identification.

2. *Identification of plants for botanists and botanical institutions.* During the past year such service has been rendered to institutions or individuals in Sweden, Germany, Switzerland, England, Canada, Cuba, Puerto Rico, Guadeloupe, British Guiana, Brazil, Nevada, California, Texas, Kansas, Michigan, Missouri, Illinois, Arkansas, Florida, District of Columbia, Pennsylvania, New Jersey, New York, and Massachusetts, and possibly also from other places. In accordance with the usual custom, these specimens become the property of the Botanical Garden and are usually added to our permanent collections. It scarcely needs be added that a similar

service is given us by numerous botanical institutions, both American and foreign.

3. *Use of the herbarium by visiting botanists.* The botanists who have used our herbarium for periods of from one day to three months during the past year, in connection with their own research, have represented the University of California, Pomona College, Missouri Botanical Garden, University of Missouri, Field Museum of Natural History, University of Florida, University of Tennessee, University of Cincinnati, University of Michigan, United States National Herbarium, Bureau of Plant Industry, University of Pennsylvania, Philadelphia Academy of Natural Sciences, Rutgers University, Syracuse University, Cornell University, Brooklyn Botanic Garden, Yale University, Gray Herbarium, Arnold Arboretum, University of Puerto Rico, Experiment Station of Cuba, University of München, Lund (Sweden) University.

4. *Loans of herbarium specimens.* Herbarium material is loaned freely to responsible institutions, and in rare cases also to individuals, to be used in current research. Although the year 1938 shows a reduction in the quantity of loaned material, the total amount is nevertheless impressive. The number of loans has been 143, with 14,518 specimens. These have been sent, in amounts ranging from a single specimen to a maximum of 1,822 sheets, to 63 different institutions or individuals, located in twenty-one different states, the District of Columbia, Argentina, Brazil, Cuba, England, Germany, Holland, and Sweden.

The herbarium is in charge of Head Curator H. A. Gleason. Curator Fred J. Seaver and assistants supervise the fungus collections; Associate Curators Percy Wilson, A. C. Smith, H. N. Moldenke, and Assistant Curator W. H. Camp, assist with the collections of higher plants, Assistant Curator E. J. Alexander is in charge of the local herbarium, Research Associate R. S. Williams supervises the mosses and lichens, Technical Assistant Rosalie Weikert has charge of the herbarium of Algae and Hepaticae, Honorary Curator Robert Hagelstein is active in the development and organization of the collection of Myxomycetes; Collaborator Otto Degener continues his studies of Hawaiian Flora; Docent G. L. Wittrock is responsible for the records and supervises the physical care of the general herbarium; Miss Margaret Wheeler continues in charge of the Mounting Room. In addition to funds for desirable material and increased staff, the outstanding need of the herbarium is suitable cases for filing the collections. At present nearly one quarter of the herbarium is filed in temporary paper cases which constitute a fire hazard and are not insect-proof or dust-proof.

The library last year served scientists, horticulturists, students, and other visitors from nearly 30 states and 19 foreign countries, besides members of the staff. Miss Hall is shown here assisting student gardeners.

Library

The library of The New York Botanical Garden is one of the most important collections of books and pamphlets on horticulture, botany, and related subjects. It contains 46,874 bound volumes and several thousand unbound volumes and pamphlets. During the past year 1,802 unbound volumes and pamphlets and 958 bound volumes were added to the collection, and the periodicals and continuations regularly received number well over 600.

The library of The New York Botanical Garden is not only of service to botanists and horticulturists of New York City but to professionals and amateurs from all parts of the world. During the past year the library was consulted by visitors from more than 30 states, territories, and possessions of the United States, including the Hawaiian Islands and Puerto Rico and from 19 foreign countries, including Argentina, Belgium, Canada, Chile, China, Cuba, England, Estonia, France, Germany, the Irish Free State, Italy, Japan, Malay States, Mexico, Netherlands, New Zealand, Sweden, and Switzerland. Members of the staff or students of more than 100 colleges, universities, botanical gardens, museums, academies, and other similar institutions are included in this group.

During the past year 14,828 catalogue cards were added to the library consisting of 4,851 typewritten cards, 4,244 cards of the Torrey Botanical Club and 5,733 Gray Herbarium species cards. Three units of catalogue card files and base cupboards were purchased adding 225 additional drawers.

In addition to routine duties the library staff, under Librarian Elizabeth C. Hall with the assistance of the bibliographer Dr. John Hendley Barnhart and assistant librarian Mrs. L. D. Schwarten, has prepared reference card files on horticulturists and on the officers and addresses of various plant societies, lists of titles on special subjects of current interest, aided in initiating the preparation of an index to the Gardeners' Chronicle (London) and prepared 36 exhibits of books and pamphlets of importance in connection with the Saturday afternoon lectures.

The growth of the library and increase in its use make reading room space and more stacks imperative in the near future. Additional steel files and map cases and improvement in the lighting of the library are also needed.

Museum Exhibits

No material change has been made in the exhibits in the Museum and Administration Building. Changes designed to increase the value of these exhibits for the public should be made as soon as funds for the purpose can be found.

Publications

The publications of The New York Botanical Garden concern chiefly taxonomy, mycology, horticulture, and popular subjects of botanical and horticultural interest.

North American Flora. In conception the oldest (dating from 1895) and still the most monumental work is *North American Flora* which is planned to be completed in 34 volumes of four or more parts each, covering the flora of North America, including Greenland, the West Indies, and Central America. Since the first published part, which appeared in 1905, eighty-seven parts have been issued totaling 6,832 pages. North American Flora is edited by Head Curator H. A. Gleason, Bibliographer J. H. Barnhart, and Curator F. J. Seaver.

During the year two parts of North American Flora have been published. Volume 19, part 2, Bromeliaceae, was written by Dr. L. B. Smith of the Gray Herbarium, the leading American student of this important family, which is noted for numerous ornamental species in cultivation. Volume 29, part 2, presenting the Apocynaceae, is the work of Dr. R. E. Woodson, Jr., of the Missouri Botanical Garden, the recognized authority on the American species.

Editorial work on two other parts, dealing with smut-fungi and with grasses, is in an advanced state, and their publication may be expected in the first half of 1939. Editorial work has begun on another part dealing with a portion of the Composite Family.

The amount of scholarly effort necessary to produce an authoritative taxonomic study of any group of plants is great, and the completion of such a huge work as North American Flora will be the labor of many years to come. That the staff of The New York Botanical Garden is itself insufficient to produce North American Flora is at once obvious. For many groups of plants specialists from other institutions contribute. At the present time every taxonomist on the staff of The New York Botanical Garden is directly at work on North American Flora, or is engaged in research applicable to it.

Many of the most eminent botanists of America and Europe are cooperating in the work. Their own share of the task must, in general, be done as an addition to their regular official duties. They exemplify in a most striking way the spirit of cooperation which exists among the botanists of the world.

The following table shows the location and number of botanists now engaged in this work:

Location	*Institution*	*Number*
Kew, England	Royal Botanic Gardens	1
Kent, England	———	1
Utrecht, Holland	Botanisch Museum	1
Stockholm, Sweden	Royal Museum	1
Toronto, Canada	University	1
Puerto Rico	University	1
	College of Agriculture	1
Massachusetts	Gray Herbarium	1
	Arnold Arboretum	1
New York	State College	1
	Brooklyn Botanic Garden	2
	Cornell University	3
	Syracuse University	1
	Columbia University	1
Pennsylvania	State College	2
	Philadelphia Academy	1
Maryland	University	1
District of Columbia	Bureau of Plant Industry	7
	National Herbarium	3
	Catholic University	1
West Virginia	University	2
Ohio	State University	1
Michigan	University	4
Indiana	De Pauw University	1
Illinois	Field Museum	2
Wisconsin	University	1
North Carolina	University	2
Missouri	Missouri Botanical Garden	2
	University	2
Iowa	State College	1
	University	1
Arizona	University	1
Oregon	Agricultural College	2
California	University (Berkeley)	2
	University (Los Angeles)	1
	Leland Stanford Jr., University	2
	Pomona College	1
New York Botanical Garden		6
Institutions	37	
Private Investigator	1	
Number of Investigators at work, local	6	
Collaborators	60	
Plant Groups in preparation	61	

Mycologia. Established in 1908 as a successor to the *Journal of Mycology*, *Mycologia* is the official organ of the Mycological Society of America with Curator F. J. Seaver as managing editor-in-chief. Volume 30 for 1938 contained 707 pages and 64 signed articles.

Addisonia. Established in 1916 by a bequest from Judge Addison Brown, *Addisonia* is devoted exclusively to the illustration of colored plates of the plants of the United States and its territorial possessions and of other plants flowering in the Garden or its conservatories with suitable descriptions in popular language and any desirable notes and synonymy

and a brief statement of the known properties and uses of the plants illustrated. Under the editorship of Assistant Curator E. J. Alexander two numbers completing Volume 20 were issued in 1938.

Brittonia. Edited by Associate Curator A. C. Smith, *Brittonia* is devoted to technical papers in plant taxonomy and geography. Two numbers were published in 1938, the final number of Volume 2 and the first number of Volume 3. These two numbers total 229 pages.

Journal. The 39th volume of the Journal of The New York Botanical Garden was completed in 1938 with Editorial Assistant Carol H. Woodward in charge. The *Journal* is devoted to popular yet authoritative articles of general interest. A change in style of the magazine has resulted in greater interest in it and a wider distribution and leaves little doubt that there is a place for a larger magazine of this type.

Monograph on Carex. Work has continued on the preparation for publication of an atlas of plates on *Carex* by the late Kenneth K. Mackenzie, for many years a member of the Board of Managers of The New York Botanical Garden. A bequest left by Mr. Mackenzie will be used to publish this authoritative work, which should appear in 1939 in two quarto volumes of about 540 pages each.

Miscellaneous Publications. Numerous special articles by members of the staff on a variety of subjects of botanical and horticultural interest have appeared in journals and magazines, some edited or published by the Garden, others not. These are listed on pages 20 to 23.

Photography

The photographic department under the supervision of Miss Fleda Griffith took 1,410 negatives, developed 2,204 negatives, made 4,880 prints, 270 enlargements, and 920 lantern slides, 463 of which were colored. In addition through the co-operation of the Works Progress Administration a photographic index of the Garden negatives and lantern slides is being prepared.

Education

One of the purposes of The New York Botanical Garden, stated in the Act of Incorporation, is instruction of the people in the culture of plants, flowers, shrubs, and trees, in botanical science and knowledge and in kindred subjects. Within the limitations of its facilities and resources the Garden has carried out this purpose from the date of its establishment under a fairly consistent policy. It has been the aim of The New York Botanical Garden to develop its educational program chiefly for adults, although freely offering its facilities and cooperation for the instruction of children. This policy was originally adopted and has been continued because staff and funds were not available for an extensive program covering the entire field of education and other agencies were available and active for younger people. In accordance with this policy the following formal and informal instruction was given during the past year under the supervision of Dr. Stout, Curator of Education and Laboratories, and Mr. Everett, Horticulturist, with the assistance of Carol H. Woodward and other members of the staff.

Free Public Lectures. Three series of public lectures were given on Saturday afternoons from September until June, a total of 37 lectures. The average attendance for the spring session was 139 and for the fall session 106. Last year the average attendance was 80. Members of the staff and lecturers from the outside participated in this series.

Courses in Botany. Three courses in botany were offered, all concerned with the identification of trees, shrubs, flowers, and ferns. Very few students registered for these courses which will probably not be offered another year.

Course in Botanical Exploration. A course of four periods on Botanical Exploration was given in cooperation with the American Institute to a special class of 12 selected high school students.

Course in Rock Garden Construction. A course in rock garden construction consisting of 12 periods in July, August, and September was given by Mr. A. C. Pfander and taken by 18 people. In addition to lectures the course included the construction of miniature rock gardens.

Two-Year Science Course for Professional Gardeners. Under the supervision

of Mr. Everett and with the cooperation of the scientific staff the two-year science course for professional gardeners was continued.

Beginning in January a course of 12 lectures on systematic botany was taught by Dr. Moldenke and a course of 12 lectures on plant physiology by Dr. Camp. The registered attendance at these lectures averaged 34.

In April graduation exercises were held for 8 students who had successfully completed the two-year course.

In October, Dr. Gleason began a course of 12 lectures in ecology and plant geography, and Dr. Dodge gave a course of 12 lectures in plant pathology. Thirty-seven students registered for each of these courses.

Two-Year Course in Practical Gardening. A two-year course in practical gardening, including six subjects, was initiated during the year. A certificate will be awarded to students who satisfactorily finish this work. In January Mr. McKenna began the first subject on outdoor gardening to a class of 38, and in September Mr. James Esson began a series of similar length on the cultivation of trees and shrubs. The registration for this series was 59. In addition, a special course of 8 evening lectures was given by Mr. P. J. McKenna on "Introduction to Gardening", registration 18, and one of 10 afternoon lectures and demonstrations on "Gardening Practice for the Home Grounds", registration 15.

Graduate Work. In accordance with the cooperative arrangements with Columbia University and Fordham University graduate students in botany may take work at The New York Botanical Garden under the direction of members of our staff. During the past year 11 graduate students were registered. In addition two teachers in the high schools of New York City worked under the direction of members of the staff, and 8 scholars were in residence during 1938 for periods of one or two months. The activities noted above constituted the organized educational work of the Garden.

Works Progress Administration. In addition, facilities were furnished for an educational program under the direction of the Works Progress Administration, known as the "West Day Camp". More than 80,000 school children in classes from public schools of the boroughs of the Bronx, Manhattan, Queens, and Brooklyn visited the Garden and were instructed by supervisors furnished by this project. Members of the staff of the Garden have given instruction on occasion to the supervisors of these children. Guides and mimeographed instruction material were supplied also for teachers with their classes from the public schools of New York City. Between 2,500 and 3,000 children were included in these groups. Other groups which have visited the Garden and have received guidance are garden clubs and groups of college students; no record of the numbers included in these groups has been kept. Nearly 100 lectures to horticultural and botanical organizations were given by members of the staff during the past year.

Training of Professional Gardeners. As a portion of the Educational Program reference should be made to the training of gardeners at The New York Botanical Garden. A two-year training course in gardening for suitably prepared young men was initiated seven years ago. During the past year 13 student gardeners and 3 apprentice gardeners were enrolled in this program. Arrangements were completed whereby a third exchange of student gardeners with the Royal Botanic Gardens, Kew, England, went into effect, and in June Mr. Fraser MacCartney left to spend a year in England, and Mr. Philip A. Chandler arrived from Kew to remain with us until June 1939. The transportation expenses of these exchange students were paid by the National Association of Gardeners and the English Speaking Union of the British Empire respectively.

Plans are being completed to effect an additional exchange with the Royal Botanic Garden at Edinburgh next year.

Information

The service of the Garden as a source of dependable information on botanical and horticultural matters has continued. Several thousand requests by mail, telephone, and in person have been answered during the past year. All members of the staff serve in this capacity, each responding according to his or her special information and training. It is not possible to detail the information supplied in this

Science and horticulture are frequently combined in the work of The New York Botanical Garden. Dr. Stout and Miss Chandler are checking records of plants used in breeding experiments.

fashion or to estimate its importance, but since requests continue to be received and apparently in increasing numbers, this aspect of the Garden's service seems to be appreciated by the public. The requests range from the identification of a plant fragment found in the pocket of the late "F. Donald Coster", questions on plant diseases and horticultural practice, to matters of technical and scientific importance. Its library, collections, and trained staff make the Garden peculiarly fitted for furnishing information.

Research

Although no one can deny the significance of the Garden for the display of plants, for recreation, information, and education, the maintenance of the Garden and its staff could not be justified unless it added by research to our knowledge of plants. Research activities of the Garden, which are limited only by its staff and equipment, fall into several divisions as follows:

Studies on reproduction of flowering plants by Dr. Stout and assistants. These studies are directed primarily to determining the possibilities and limitations of reproduction in the flowering plants and secondarily the production of new varieties of horticultural and commercial importance. They include:

1. *Experimental studies to determine the inheritance of self and cross incompatibility.* A culture of Rosy Morn Petunia and certain cultures of Hemerocallis are being utilized.

2 *Studies of sterilities in hybrids between Lobelia cardinalis and Lobelia syphilitica.* Some of the hybrids, which are of wide color range, may prove to be of horticultural value.

3. *Studies on the botanical status, sterility, cytology, and development of new horticultural clones of various types of Lilium tigrinum and Lilium candidum.*

4. *Studies on the development of seedless hardy grapes in cooperation with the New York Agricultural Experiment Station at Geneva.* Progress has been made in developing new varieties by cross pollination, some of which show promise for commercial purposes.

5. *Study in the taxonomy, hybridization, and hybrid breeding, sterility and fertility, and the record of evaluation of horticultural clones of the daylily.* A folio illustrated with colored plates is in preparation.

6. *Research on poplars.* This work has been included in a comprehensive project of tree breeding organized in the United States Forest Service with Dr. E. J. Schreiner in charge. Dr. Stout is serving in an advisory capacity as collaborator.

Studies in plant pathology and genetics of fungi by Dr. Dodge and assistants.

1. *Studies of plant diseases.* Progress has been made on the studies of rots of Opuntia and a septoria spot disease of Chrysanthemums.

2. *Genetics of fungi.* Other demands have necessitated a curtailment of the fundamental and important studies which have been made on the genetics of fungi, although some progress has been made on the inheritance of lethals.

Studies in taxonomy by Dr. H. A. Gleason and assistants. In general the research in this field falls into three groups.

1. *Revision of certain families for publication in North American Flora.*

2. *The completion of Small's "Manual of the South Central Flora".*

3. *Monographic studies on selected families and genera and miscellaneous studies.*

The Head Curator, H. A. Gleason, has continued studies on the *Melastomataceae,* partly for *North American Flora,* and partly for the *Flora of Yucatan* now in course of publication by the Carnegie Institution in cooperation with the University of Michigan. He has also been engaged in the identification of plants from Mount Auyan-Tepui, Venezuela.

Curator F. J. Seaver has continued his studies on the cup-fungi and is cooperating with Dr. H. H. Whetzel in a survey of the fungus flora of Bermuda and with Dr. C. E. Chardon in a survey of the fungi of Venezuela.

Associate Curator Percy Wilson continued his work on the flora of the West Indies.

Associate Curator A. C. Smith made an extended trip to the southern part of British Guiana as a member of the Terry-Holden Expedition. He collected extensively along the boundary between British Guiana and Brazil, heretofore unknown botanically, and later in the Kanuku Mountains, an isolated group rising above the savannas of southwestern British Guiana. He has been engaged in the organization of his large collections, amounting to about 17,000 specimens. A monograph of the American species of the Nutmeg family was completed by Dr. Smith and is an important addition to taxonomic literature.

Associate Curator H. N. Moldenke continued his monographic studies of the *Verbenaceae* and in cooperation with Mr. B. A. Krukoff completed an exhaustive taxonomic study of the plants used in the preparation of the important drug, *curare.*

Assistant Curator E. J. Alexander has been engaged in the preparation of a manuscript for *North American Flora,* dealing with certain genera of the Compositae.

Assistant Curator W. H. Camp has continued the identification of his own collection from the State of Oaxaca, Mexico, and is completing a monograph on the *Vacciniaceae.*

Collaborator Otto Degener has continued his exploration and study of the Hawaiian flora. Book III of his "Flora Hawaiiensis or New Illustrated Flora of the Hawaiian Islands" was completed, and progress was made on Book IV. Many isolated valleys and mountains yet remain to be explored, and aggressive study of this area seems desirable before the endemic plants are further reduced by settlement of this region.

Honorary Curator Robert Hagelstein has continued his studies and collection of Myxomycetes. Reference is made elsewhere to these collections.

I regret to report that because of extraordinarily limited funds little progress has been made on the completion of Small's "Manual of the South Central Flora" Expenses for exploration in the southwest and for secretarial help are needed before this project can be pushed to completion.

Studies in plant physiology by W. J. Robbins and assistants. With the installation of a laboratory, work has been initiated on the importance and function of growth substances for plants. A biologic method for determining the growth substance biotin has been devised, and a new material, vitamin B_6, has been found to be important for the growth of the roots of tomato. A grant of $1,500 was received from the American Philosophical Society to support this work.

Garden Membership

The total membership of the Garden is 1,180 classified as follows: Annual, 928; Sustaining, 62; Life, Benefactor or Patron, 108; Garden Clubs, 20; Garden Courses, 62. A complete list of members is appended.

Works Progress Administration

A report for the year 1938 would not be complete without acknowledgment of assistance from the Works Progress Administration, particularly the Women's and Professional Division. Between seventy and seventy-five individuals under the Women's and Professional Division have given valuable assistance in activities which the Garden would be unable otherwise to support adequately. It is not possible to list in detail the assistance given, but the major activities under the direction of various members of the staff, especially Docent Wittrock, have been as follows:

1. Mounting, labeling, repairing and filing herbarium collections.

2. Preparation of a bibliography of the food plants used by the Indians.

3. Preparation of an index of The Gardeners' Chronicle (London). This magazine has well over 100 volumes but no complete index.

4. Preparation of an index and file of the negatives and lantern slides of The New York Botanical Garden.

5. Repair of library books.

6. Preparation of an index of the plants of North Carolina.

7. Assistance in research work and the preparation of illustrations and manuscripts on plant diseases and their control, plant breeding, the distribution and identification of plants, the function of growth substances and bibliographies.

Special Events

In addition to the usual activities of the Garden a number of special events may be mentioned.

Jan. 1 to 7: Exhibit in the rotunda and mezzanine of the Museum and Administration Building of ornamental algae selected from our herbarium which now contains 80,000 specimens.

Feb. 6: Exhibit of Begonias, Horticultural Society of New York, silver medal awarded.

April 26: Graduation exercises for 8 student gardeners at the Beekman Tower, Col. J. E. Spingarn, speaker.

May 5: Outdoor Tea of the Advisory Council.

May 16: Annual meeting of the American Rock Garden Society followed by a visit to the Rock Garden; 50 members of the Society in attendance.

May 26 to June 1: Rock Garden Week during which the majority of 2,200 kinds of plants in the Thompson Memorial Rock Garden were in flower.

June 12 to 18: Rose Week during which most of the 6,000 rose plants were at the height of bloom.

June 20: Exhibit of daylily seedlings, Horticultural Society of New York, gold medal awarded.

July 2: Visit of the Lily Investigation Committee of the National Horticultural Society; 75 people in attendance.

Sept. 14: Exhibit at the Westchester County Horticultural Society of native flowers and fruits; special prize awarded.

Sept. 30: Special invitation to members announcing the blooming of 900 dahlias in 400 different varieties, of 2,500 hardy asters in 70 kinds, and of 3,000 plants of hardy chrysanthemums in 72 varieties.

Oct. 8: Visit of the Biology Teachers of the General Science Association of New York, 40 teachers in attendance.

Oct. 11: Tea by Mrs. Jerome W. Coombs for Garden Club members at The New York Botanical Garden.

Oct. 15: Lecture on Chrysanthemums in Art and visit of the School Art League; 700 members in attendance.

Oct. 15 to 30: Exhibit of Plant Forms Adapted for Ornamental Design, illustrated with photographs by Fleda Griffith and Rutherford Platt, with spatter-prints by Anna Gilman Hill, and with herbarium specimens, in the Museum and Administration Building.

Nov. 1 to 19: Exhibit of orchids in watercolor, 40 paintings by Jane Davenport Harris, made of plants collected by the artist in Central America.

Dec. 8 and 9: Eastern Shade Tree Conference. A two-day meeting attended by 250 people to consider the hurricane damage to trees in the northeastern states and to suggest means of rehabilitation.

Dec. 10: Inspection visit of the Advisory Council.

Dec. 14 to Jan. 1: Exhibit of 148 paintings of individual flowers and landscapes of Korea by Mrs. Florence H. Crane.

Needs of the Garden

During the past year strict economy has been practised because of the reduction of income from invested funds and the decrease in gifts from public-spirited benefactors. Nevertheless, the needs of the Garden are numerous and pressing, if it is to attain its full possibilities. These may be briefly listed as follows:

1. Extensive modernization of Museum and Administration Building.

2. Addition of wings to the Museum and Administration Building.

3. A comfort station and shelter west of the Bronx River.

4. Reconstruction of the propagating range taken over from the Park Department.

5. Development of the stables as a service building.

6. Reconstruction of snuff mill as a center for adult education.

7. A large temperate greenhouse near Range 1 for display of coolhouse plants.

8. Steel cases for the herbarium.

9. Modernization of museum exhibits in the Museum and Administration Building.

10. Additional endowment for **Addisonia.**

11. Additional funds for exploration, publication, library books, herbarium additions, scholarships or fellowships, and scientific research.

12. A pension system.

13. Increase in staff, which is smaller in numbers now than previously but should be larger to keep pace with the growth of the Garden and its responsibilities.

14. An area outside of New York City, which can be used for the propagation of material for the Garden, for testing perennial material for this region, and for long-time experiments on shrubs and trees. This area should have its own endowment.

It will doubtless be many years before all of these desiderata materialize. In the meantime, the staff of the Garden will continue to do its best with the facilities at hand.

In closing this report may I express my appreciation for the consideration, advice and wise direction which has been received from the Board of Managers and especially from the President of the Board, Mr. Joseph R. Swan, and other members of the Executive Committee. I must acknowledge also the sympathetic interest and material assistance of the members of the Advisory Council and lastly acknowledge my indebtedness to the members of the staff and other employees of The New York Botanical Garden for their active and intelligent cooperation in the program of the Garden.

PUBLICATIONS OF THE STAFF NEW YORK BOTANICAL GARDEN 1938

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Lilium Hansonii. Hanson's lily. Addisonia **20**: 33, 34. *pl. 657.* 20 Je 1938.
Kunzea ambigua. Addisonia **20**: 39, 40. *pl. 660.* 20 Je 1938.
Eriogonum Alleni. Yellow buckwheat. Addisonia **20**: 43, 44. *pl. 662.* 20 Je 1938.
Habitat hunting in mountains of the southeast with student gardeners. Jour. N. Y. Bot. Gard. **39**: 228–233, 236–240. *illust.* [26] O 1938.

Barnhart, John Hendley
(Co-editor: North American Flora. Editor: New York Academy of Sciences.)
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The passing of Doctor Small. Jour. N. Y. Bot. Gard. **39**: 73–79. *portr.* [20] Ap 1938.
Taxonomic list, with citations. In: SMALL, JOHN KUNKEL. Ferns of the southeastern states. 465–486. [4 O] 1938.
Authorities cited in this work. In: SMALL, JOHN KUNKEL. Ferns of the southeastern states. 487–492. [4 O] 1938.
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Bibliography [of Marshall Avery Howe, 1867 1936]. Nat. Acad. Sci. Biog. Mem. **19**: 259–269. [8 N] 1938.
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Camp, Wendell Holmes
(Editor: Taxonomic Index.)
Studies in the Ericales III. The genus Leiophyllum. Bull. Torrey Club **65**: 99–104. 1 F 1938.

Chandler, Florence Clyde
An appreciation of Raymond H. Torrey. Torreya **38**:108, 109. 3 S 1938. (With HAROLD NORMAN MOLDENKE and JOHN SIDNEY KARLING.)

Dodge, Bernard Ogilvie
(Associate Editor: Torrey Botanical Club.)
A further study of the dry-rot disease of Opuntia. Mycologia **30**: 82–96. *f. 1–5.* 1 F 1938.
The combined effects of the dominant and the recessive lethals for ascus abortion in Neurospora. Am. Jour. Bot. **25**: 156–166. *f. 1–7.* 21 Mr 1938. (With BERNICE SEAVER.)
Material for demonstrating the essential features of a basidiomycete. Mycologia **30**:133–136. *f. 1, 2.* 1 Ap 1938.

Everett, Thomas Henry
Plant portraits. Gard. Chron. Am. **42**: 9, 10. *illust.* [1] Ja 1938; 73, 74. *illust.* [1] Mr 1938; 155, 156. *illust.* [1] Je 1938; 241, 242. *illust.* [1] S 1938.
Planning the annual border. House & Garden **73²**: 48, 49, 62, 78, 79, 81. *illust.* "F" [Ja] 1938.
Your indoor desert garden. Nat. Hist. **41**: 93–102. *illust.* F 1938.
Plants from seed and from cuttings. N. Y. Times **87 (29233)**: 8 D. 6 F 1938.
Eine Titanenwurz blüht auf. Gartenschönheit **19**: 47 50. *illust.* F 1938. [Uebersetzt von Camillo Karl Schneider.]
Begonia semperflorens var. Gustav Lind. Gard. Chron. III. **103**: 160, 161. *f. 65.* 5 Mr 1938.
New double-flowered wax begonia. Horticulture **16**: 180. *illust.* 15 Ap 1938.
Sowing annuals in the open garden. Real Gard. **1¹**: 28–32. "My" [25 Ap] 1938.
Hardy 'mums widely used. N. Y. Times **87 (29324)**: D 7. 8 My 1938.
Lotus Berthelotii. Pelican's beak. Addisonia **20**: 41, 42. *pl. 661.* 20 Je 1938.
Convolvulus Cneorum. Silver-bush. Addisonia **20**: 45, 46. *pl. 663.* 20 Je 1938.
Begonia speculata. Gard. Chron. III. **103**: 448. *f. 180.* 25 Je 1938.
New way to grow Amaryllis. N. Y. Times **87 (29401)**: 7 D. *illust.* 24 Jl 1938.
Begonia Poggei. Gard. Chron. III. **104**: 114. *f. 56.* 13 Au 1938.
For real success with herbaceous borders. Real Gard. **1⁶**: 66–72. "S" [25 Au] 1938.

Searching for lawn grass substitutes. Horticulture **16**: 344. 1 S 1938.
A begonia tangle cleared up. Horticulture **16**: 350. 1 S 1938.
A better palm for the window. N. Y. Times **88 (29464)**: 9 D. *illust.* 25 S 1938.
Building the garden soil. Real Gard. **1**[6]: 82–86. "O" [26 S] 1938.
Dig now and deeply - it pays dividends. N. Y. World-Telegram **71 (78)**: 14. 1 O 1938.
Gardens of hardy heaths and heathers. Real Gard. **1**[8]: 78–84. *illust.* "D" [25 N] 1938.
Begonia semperflorens var. Calla Lily. Gard. Chron. III. **104**: 402. *f. 169.* 3 D 1938.

Gleason, Henry Allan
(Co-editor: Phytologia. Co-editor: North American Flora. Associate Editor: Torrey Botanical Club.)
Annual report of the Acting Director for 1937. Jour. N. Y. Bot. Gard. **39**: 7–18. *illust.* [24] Ja 1938.
Notes on American melastomes, including nine new species. Bull. Torrey Club **65**: 571–580. 1 N 1938.

Hagelstein, Robert
Myxomycete collecting. Jour. N. Y. Bot. Gard. **39**: 19, 20. [24] Ja 1938.
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Notes on the Mycetozoa—II. Mycologia **30**: 336–353. 1 Je 1938.

Hall, Elizabeth Cornelia
Trends in garden books. Publishers' Weekly **133**: 817, 818. *illust.* 12 F 1938.
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Garden books for Christmas gifts. Flower Grower **25**: 497–499. *illust.* "N" [O] 1938.
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Kavanagh, Frederick Walker. See Robbins, William Jacob.

Moldenke, Harold Norman
(Co-editor: Phytologia.)
A monograph of the genus Petrea. Repert. Sp. Nov. Regni Veg. **43**: 1–48. 10 Ja 1938; 161–221. 1 F 1938.
[Field trips of the Torrey Botanical Club.] Trip of August 29 to Washington Valley and Watchung, N. J. Torreya **38**: 10, 11. 26 F 1938.
[Field trips of the Torrey Botanical Club.] Trip to the Green Mountains, September 4, 5, and 6. Torreya **38**: 11, 12. 26 F 1938.
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A seventh supplement to edition 3 of H. N. Moldenke's The observed flora of Watchung, N. J., and its immediate vicinity. 1, 2. 13 Je 1938. [Mimeographed; 100 copies.]
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[Field trips of the Torrey Botanical Club.] Trip of June 4 to Washington Valley, N. J. Torreya **38**: 103, 104. 3 S 1938.
[Field trips of the Torrey Botanical Club.] Trip of June 5 to Seeley's Notch, Scotch Plains, N. J. Torreya **38**: 104, 105. 3 S 1938.
An appreciation of Raymond H. Torrey. Torreya **38**: 108, 109. 3 S 1938. (With FLORENCE CLYDE CHANDLER and JOHN SIDNEY KARLING.)
Life as Associate Curator for the New York Botanical Garden. Susquehanna Alumnus II. **2**[1]: 7, 9, 13. *illust.* [30] S 1938.
Cultivated plants. 1–41 18 N 1938. [Mimeographed; 100 copies.]
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Against parallel gradation at shows. Horticulture **16**: 130. 15 Mr 1938.
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Organisms requiring vitamin B_1. Proc. Nat. Acad. Sci. 24:53–56. 15 F 1938.

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[Thiamin and plant growth.] Torreya 38:160. 17 D 1938. [Abstract.]

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Seaver, Fred Jay

(Editor, Mycologia. Co-editor: North American Flora.)

Photographs and descriptions of cup-fungi—XXVIII. A new Helotium. Mycologia 30:79–81. *f. 1.* 1 F 1938.

[Notes and brief articles.] Mycologia 30:108, 109. 1 F 1938; 243, 244. 1 Ap 1938; 334. 1 Je 1938.

Mycologia finance (1937). Mycologia 30:110. 1 F 1938.

The myxomycete collection of the New York Botanical Garden. Mycologia 30:475. 1 Au 1938.

A gigantic mushroom. Jour. N. Y. Bot. Gard. 39:212. *illust.* [26] S 1938.

Photographs and descriptions of cup-fungi. XXIX. Chloroscypha. Mycologia 30:594–596. *f. 1.* 1 O 1938.

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Fungi of the human ear. Mycologia 30:692–694. 1 D 1938.

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Ferns of the southeastern states. 1–517. [4 O] 1938.

Smith, Albert Charles

(Editor, Brittonia)

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Sciadophyllum chartaceum. Field Mus. Publ. Bot. 18:1562, 1563. 30 N 1938.

Stout, Arlow Burdette

Daylilies with rosy pink coloring. Horticulture 16:226. 15 My 1938.

The flowering behavior of Norway maples. Jour. N. Y. Bot. Gard. 39:130–134. *illust.* [15] Je 1938.

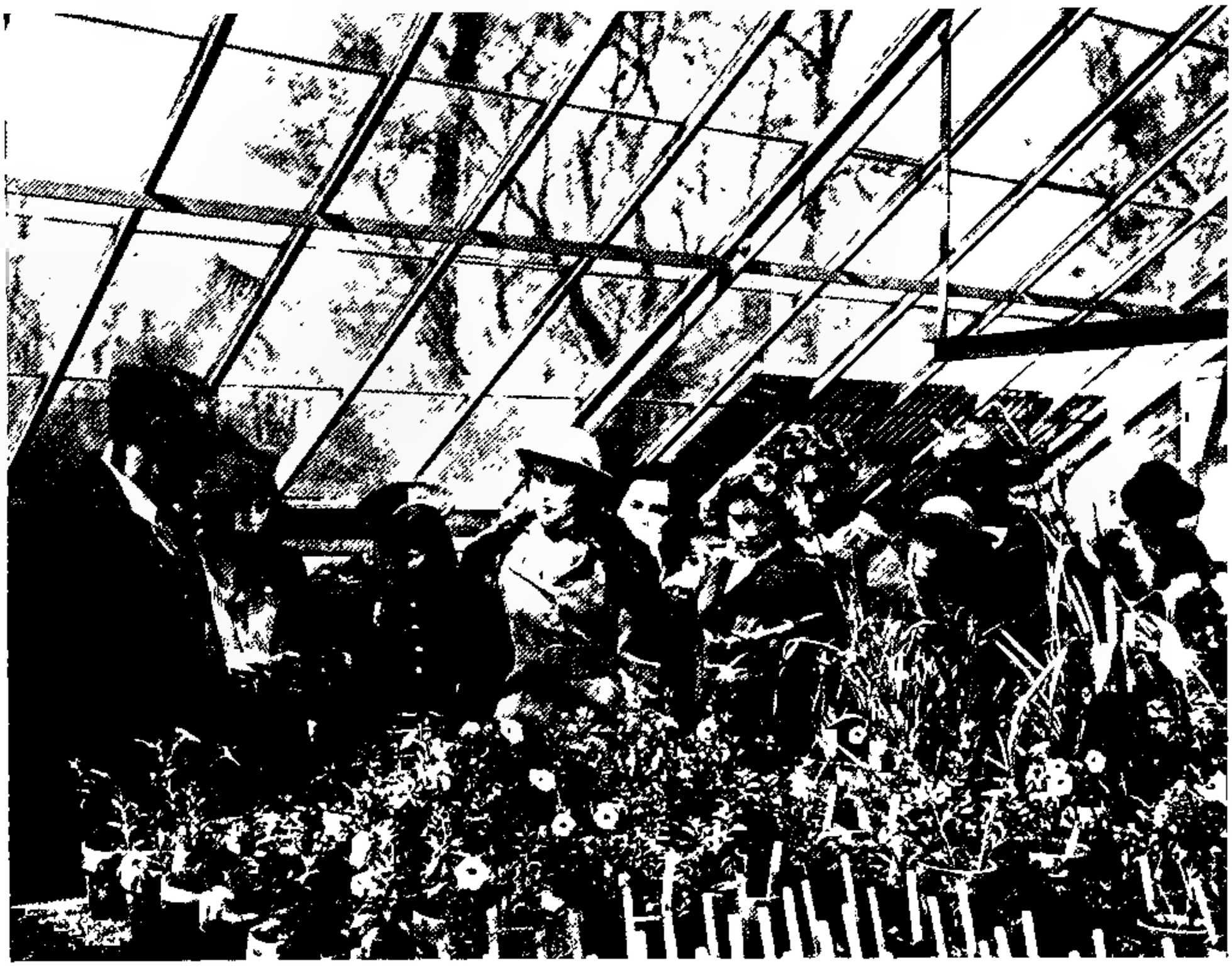
The genetics of incompatibilities in homomorphic flowering plants. Bot. Rev. 4:275–369. *f. 1–21.* Je 1938.

Die Gartenzüchtungen der Taglilien. Ergebnisse amerikanischer Forschungsarbeiten. Gartenschönheit 19:268–271. *illust.* Jl 1938. (Uebersetzt von CAMILLO KARL SCHNEIDER.)

What about daylilies? Real Gard. 1[5]:5–11. *illust.* "S" [25 Au] 1938.

The new Boutonniere daylily. Horticulture 16:380. *illust.* 1 O 1938.

Seed patterns and incompatibilities in Lilium candidum. Roy. Hort. Soc. Lily Year-book 7:108–122. *f. 23–31.* N 1938. (With WILLARD MERRITT PORTERFIELD.)



Many classes of students are guided through the grounds and greenhouses and given instruction by a member of the staff. Mr. Wittrock here is explaining some features of work in the greenhouses to a class of girls from Larchmont.

Some chronicles in grape history. I. Jour. N. Y. Bot. Gard. **39**: 254–263. *illust.* [23] N 1938; II. **39**: 274–281. *illust.* [23] D 1938.

In memoriam—George Yeld. Herbertia **5**: 61. N 1938.

Wittrock, Gustave Ludwig

Erythronium multiscapoideum. Sierra fawn-lily. Addisonia **20**: 37, 38. *pl. 659.* 20 Je 1938.

Woodward, Carol Helen

(Editor: Journal of the New York Botanical Garden.)

Mantle of flowers on the mountainous Schlossberg. Christian Sci. Monitor **30 (33)**: Mag. Sect. 15. *illust.* 5 Ja 1938.

Wishbone flower. Country Gentleman **108**: 79. "F" [18 Ja] 1938.

Ideals in horticulture. Progr. 25th Internat. Fl. Show 154, 155. *illust.* [14] Mr 1938. [Anonymous.]

Microscopic sulphur. Fl. Exch. **90**[16]: 36. 16 Ap 1938.

Alorco cryolite as an insecticide. Fl. Exch. **90**[16]: 52. 16 Ap 1938.

A wax emulsion for woody plants. Fl. Exch. **90**[18]: 20. 30 Ap 1938.

Mecca of rock gardeners. N. Y. Times **87 (29338)**: 7 D. *illust.* 22 My 1938.

Two thousand rock plants. Am. Nurseryman **67**[11]: 5, 6. *illust.* 1 Je 1938.

Park celebrates rose week. N. Y. World-Telegram **70 (291)**: 11. *illust.* 11 Je 1938.

Annual rose week at Botanical Garden. N. Y. Times **87 (29359)**: D 9. *illust.* 12 Je 1938.

Lily devotees on pilgrimage. (N. Y.) Sun **105 (262)**: 33. *illust.* 9 Jl 1938.

"Little gardens" in central Europe. Christian Sci. Monitor **30 (228)**: Mag. Sect. 10. *illust.* 24 Au 1938.

Amerika baute einen Modellsteingarten. Gartenschönheit **19**: 337–339. S 1938. (Uebersetzt von CAMILLO KARL SCHNEIDER.)

New tropical and desert scenes are created in gardens under glass. N. Y. Times **88 (29548)**: 12 D. *illust.* 18 D 1938.

REPORT OF THE TREASURER FOR 1938

ARTHUR M. ANDERSON, Treasurer

EXHIBIT I

BALANCE SHEET

December 31, 1938

ASSETS

Permanent Fund Assets:			
Investments at cost or appraisal at time of acquisition (Exhibit III)		$2,559,882.24	
Cash awaiting investment		7,044.58	
			$2,566,926.82
Current and Working Assets:			
Cash in banks and on hand:			
For general purposes	$31,649.72		
For special purposes	14,338.65		
		$ 15,988.37	
Accounts receivable:			
City maintenance	$22,655.55		
Officer and employees	87.11		
		22,742.66	
Interest and dividends receivable (Exhibit III)		23,493.51	
Prepaid insurance premiums, etc		1,458.88	
			93,683.42
			$2,660,610.24

TO THE BOARD OF MANAGERS OF

THE NEW YORK BOTANICAL GARDEN:

We have made an examination of the balance sheet of The New York Botanical Garden as at December 31, 1938, and of the statement of operations for the year ending on that date. In connection therewith, we examined or tested accounting records of the Garden and other supporting evidence and obtained information and explanations from its officers and employees; we also made a general review of the accounting

EXHIBIT I

BALANCE SHEET

December 31, 1938

LIABILITIES

Permanent Funds (Exhibit IV):			
Restricted endowments			$ 254,479.80
Unrestricted endowments, including bequests set aside by the Board of Managers as permanent funds			2,291,288.20
Special endowment with life interest in respect of income therefrom			21,158.82
			$2,566,926.82
Current Liabilities and Special Funds:			
Current liabilities:			
Accounts payable		$ 12,956.20	
Special funds (Exhibit V):			
Unexpended income from restricted funds	$ 4,084.68		
Unexpended contributions set aside by the Board of Managers for specific purposes	10,253.97		
		14,338.65	
Deferred income credit:			
Subscriptions paid in advance		1,390.92	
Working fund:			
Balance at December 31, 1937	$65,000.00		
Deduct Excess of unrestricted expenditures over income for the year ending December 31, 1938 (Exhibit II)	2.35	64,997.65	
			93,683.42
			$2,660,610.24

methods and of the operating and income accounts for the year, but we did not make a detailed audit of the transactions.

In our opinion, based upon such examination, the attached balance sheet (Exhibit I) and related statements (Exhibits II to V, inclusive) fairly present the position of The New York Botanical Garden at December 31, 1938, and the result of its transactions for the year ending on that date.

PRICE, WATERHOUSE & Co.

56 Pine Street, New York, April 17, 1939.

EXHIBIT II

Statement of Operations for the Year Ending December 31, 1938

		Total	Restricted and special funds	Unrestricted
Income:				
Income from investment of permanent funds		$105,706.55	$ 9,832.23	$ 95,874.32
Contributions:				
City maintenance		246,250.46		246,250.46
Other		3,095.00	2,125.00	970.00
Membership dues:				
Annual		8,570.00		8,570.00
Sustaining and garden clubs		1,875.00		1,875.00
Sundry sales, fees, etc		1,829.51	402.00	1,427.51
Subscriptions and sales of publications		8,342.15	4,542.74	3,799.41
Total income		$375,668.67	$ 16,901.97	$358,766.70
Expenses:				
Horticulture:				
Salaries	$ 66,368.90			
Plants, seeds, supplies, etc	7,692.67			
		$ 74,061.57	$ 2,170.91	$ 71,890.66
Science and curating:				
Salaries	$ 52,423.29			
Specimens, supplies, research, etc	6,530.12			
		58,953.41	4,369.85	54,583.56
Library:				
Salaries	$ 9,139.92			
New books, periodicals, etc	3,008.53			
		12,148.45		12,148.45
Education:				
Salaries	$ 5,499.96			
Instructions, lectures, etc	2,943.49			
		8,443.45	900.72	7,542.73
Publications:				
Printing, mailing, etc		12,810.38	7,102.98	5,707.40
Administration:				
Salaries	$ 27,051.39			
Stationery, telephone, postage, etc	10,937.34			
		37,988.73		37,988.73
Care and up-keep—grounds:				
Salaries	$ 54,918.55			
Wages	26,734.37			
Supplies	4,677.16			
		86,330.08	194.68	86,135.40
Care and up-keep—buildings:				
Salaries	$ 53,412.23			
Fuel, light, power, etc	26,759.68			
		80,171.91		80,171.91
Improvements and equipment purchases		2,600.21		2,600.21
Totals:				
Salaries	$268,814.24			
Wages	26,734.37			
Other expenses	77,959.58			
Total expenses		$373,508.19	$ 14,739.14	$358,769.05
Excess of income or *expenses* for the year		$ 2,160.48	$ 2,162.83	$ —*2.35*

EXHIBIT III

Summary of Investments, December 31, 1938

	Par value (no par value stocks at book value)	Approximate quoted value	Book value, representing cost or appraisal at date of acquisition	Accrued interest and dividends December 31, 1938	Average yield for year on basis of	
					Quoted value	Book value
					%	%
General funds:						
Bonds	$ 556,500.00	$ 562,216.40	$ 572,291.20	$ 4,632.51	3.82	3.75
Stocks:						
Preferred	99,505.00	111,376.87	103,637.50	1,162.50	4.69	5.04
Common	26,103.80	12,886.75	27,573.63	90.00	3.49	1.63
	$ 682,108.80	$ 686,480.02	$ 703,502.33	$ 5,885.01	3.95	3.86
Sage fund:						
Bonds	$ 535,000.00	$ 520,772.82	$ 500,183.44	$ 6,254.67	3.12	3,25
Stocks:						
Preferred	178,730.34	211,423.12	183,587.85	1,106.25	4.51	5.19
Common	75,140.00	136,180.00	107,058.04	1,885.00	5.64	7.17
	$ 788,870.34	$ 868,375.94	$ 790,829.33	$ 9,245.92	3.85	4.23
Special endowment fund:						
Bonds	$ 357,000.00	$ 377,408.69	$ 368,277.58	$ 3,125.80	3.19	3.27
Stocks:						
Preferred	126,437.50	179,187.50	147,454.88	1,137.50	4.27	5.19
Common	10,000.00	23,400.00	36,345.16	300.00	5.13	3.30
	$ 493,437.50	$ 579,996.19	$ 552,077.62	$ 4,563.30	3.60	3.78
John D. Rockefeller, Jr., fund:						
Bonds	$ 290,000.00	$ 327,303.44	$ 296,845.25	$ 2,638.87	3.18	3.51
Stocks -preferred	167,068.75	249,487.50	200,256.26	1,160.41	4.37	5.44
	$ 457,068.75	$ 576,790.94	$ 497,101.51	$ 3,799.28	3.70	4.29
Special trust fund:						
Stock—common	$ 16,371.45	$ 6,549.00	$ 16,371.45			
	$ 2,437,856.84	$2,718,192.09	$2,559,882.24	$23,493.51	3.78	4.01
Recapitulation by types of securities:						
Bonds	$1,738,500.00	$1,787,701.35	$1,737,597.47	$16,651.85	3.36	3.46
Stocks:						
Preferred	571,741.59	751,474.99	634,936.49	4,566.66	4.43	5.24
Common	127,615.25	179,015.75	187,348.28	2,275.00	5.21	4.98
	$2,437,856.84	$2,718,192.09	$2,559,882.24	$23,493.51	3.78	4.01

EXHIBIT IV

Statement of Permanent Funds Showing Changes During the Year Ending December 31, 1938

	Balance January 1, 1938	Additions and *deductions*	Balance December 31, 1938
Restricted endowments:			
Endowment for science and education	$ 89,115.49		$ 89,115.49
Addison Brown Fund	21,149.31		21,149.31
John Innes Kane Fund	35,347.63		35,347.63
Maria De Witt Jesup Fund	25,000.00		25,000.00
Olivia E. and Caroline Phelps Stokes Fund	5,030.63		5,030.63
Charles Budd Robinson Fund	755.04		755.04
The H. H. Memorial Fund	5,000.00		5,000.00
Alexander P. Anderson and Lydia Anderson Research and Fellowship Fund	10,000.00		10,000.00
Students' Research Fund	10,412.00	$ 312.50	10,724.50
Endowment for the publication of "Mycologia"	5,000.00	1,000.00	6,000.00
Nathaniel Lord Britton and Elizabeth Gertrude Britton Fund	45,007.20	1,350.00	46,357.20
	$ 251,817.30	$ 2,662.50	$ 254,479.80
Unrestricted endowments:			
Endowment Fund	$ 278,809.34	*—$27,062.08*	$ 251,747.26
David Lydig Fund	34,337.86		34,337.86
William R. Sands Fund	10,000.00		10,000.00
Darius Ogden Mills Fund	48,099.17		48,099.17
Henry Iden Fund	10,000.00		10,000.00
Fanny Bridgham Fund	30,000.00		30,000.00
Frances Lynde Stetson Fund	25,000.00		25,000.00
Russell Sage and Margaret Olivia Sage Memorial Fund	804,650.83	*—13,375.94*	791,274.89
Frances Griscom Parsons Fund	2,304.67		2,304.67
Special Endowment Fund	572,500.11	*—20,107.82*	552,392.29
The John D. Rockefeller, Jr. Fund	504,901.50	*— 7,672.78*	497,228.72
The Charles Patrick Daly and Maria Lydig Daly Fund	19,636.34		19,636.34
The James A. Scrymser and Mary C. Scrymser Fund	12,750.00		12,750.00
The George N. Best Fund	3,000.00		3,000.00
The Mary Strong Shattuck Fund		3,517.00	3,517.00
	$2,355,989.82	*—$64,701.62*	$2,291,288.20
Special endowment:			
Special Trust Fund	$ 21,158.82		$ 21,158.82
	$2,628,965.94	*—$62,039.12*	$2,566,926.82

EXHIBIT V

SPECIAL FUNDS

Statement of Application of Income from Restricted Permanent Funds and Special Funds Designated for Specific Purposes

For the Year Ending December 31, 1938

	Balance January 1, 1938	Additions	Expenditures and transfers	Balance December 31, 1938
Restricted permanent funds:				
Endowment for science and education:				
Public lectures and instruction, research and publications other than "Addisonia"		$ 3,457.01		$ 3,457.01
Addison Brown Fund:				
Publication of "Addisonia"		1,480.54	$ 1,480.54	
John Innes Kane Fund:				
Purchases of plants and related expenses	$ 646.52	1,371.59	1,954.79	63.32
Maria De Witt Jesup Fund:				
Botanical collections and binding of books		973.39	973.39	
Olivia E. and Caroline Phelps Stokes Fund:				
Investigation and preservation of native plants		195.66	195.66	
Charles Budd Robinson Fund:				
Exploration		28.51		28.51
The H. H. Memorial Fund:				
Development of model gardens		194.68	194.68	
Alexander P. Anderson and Lydia Anderson Research and Fellowship Fund:				
Research	948.75	389.36	1,338.11	
Students' Research Fund:				
Scholarships and prizes	165.48	415.90	466.50	114.88
Mycologia Fund:				
Publication of "Mycologia"	979.41	4,077.88	3,636.33)	420.96
Transfer to "Mycologia" Endowment Fund			1,000.00)	
Nathaniel Lord Britton and Elizabeth Gertrude Britton Fund:				
Research, exploration, publication, purchase of plants, books, specimens, etc		1,790.45	1,790.45	
	$ 2,740.16	$14,374.97	$13,030.45	$ 4,084.68
Special funds contributed for specific purposes:				
School for Gardeners	$ 1,606.28	$ 402.00	$ 434.22	$ 1,574.06
Southern Appalachian and Rocky Mountain expeditions	216.12		216.12	
Special study of grapes	57.49		57.49	
Contribution from The American Philosophical Society:				
Vitamin research		1,500.00	1,400.86	99.14
Bequest of K. K. Mackenzie:				
Completion and publication of scientific drawings	8,426.95			8,426.95
Others	128.82	625.00	600.00	153.82
	$10,435.66	$ 2,527.00	$ 2,708.69	$10,253.97
	$13,175.82	$16,901.97	$15,739.14	$14,338.65

ELECTIVE MANAGERS AND OFFICERS
of
THE NEW YORK BOTANICAL GARDEN
1895–1938

Adams, Edward D. (*Manager*) ..... Jan. 8, 1912—May 20, 1931
(*Vice-president*) ..... Jan. 12, 1920—April 21, 1921
Anderson, Arthur M. (*Manager*) ..... Jan. 9, 1933—
(*Treasurer*) ..... Jan. 10, 1938—
Auchter, E. C. (*Manager*) ..... Nov. 18, 1938— Mch. 29, 1945
Bailey, L. H. (*Manager*) ..... Jan. 8, 1934—Jan. 10, 1938
Baldwin, Henry de Forest (*Manager*) ..... Jan. 10, 1921— May 18, 1947
(*Vice-president*) ..... Jan. 9, 1928— May 18, 1947
Baldwin, Sherman (*Manager*) ..... June 21, 1929—Jan. 13, 1930
Brewster, George S. (*Manager*) ..... Jan. 9, 1928—March 11, 1936
Britton, N. L. (*Secretary*) ..... March 21, 1895—Aug. 1, 1929
(*Director-in-Chief*) ..... July 1, 1896—Aug. 1, 1929
(*Manager*) ..... May 12, 1910—June 25, 1934
Brown, Addison (*Manager*) ..... Jan. 9, 1905—April 9, 1913
(*President*) ..... May 12, 1910—April 9, 1913
Carnegie, Andrew (*Manager*) ..... Feb. 12, 1895—Aug. 11, 1919
(*Vice-president*) ..... March 21, 1895—Aug. 11, 1919
Cox, Charles F. (*Manager*) ..... Feb. 12, 1895—April 28, 1903
(*Treasurer*) ..... March 29, 1899—Jan. 24, 1912
Cravath, Paul D. (*Manager*) ..... Jan. 12, 1920—Jan. 9, 1928
Cutting, W. Bayard (*Manager*) ..... March 4, 1896—March 1, 1912
Daly, Charles P. (*Manager*) ..... Feb. 12, 1895—Sept. 19, 1899
de Forest, Henry W. (*Manager*) ..... Jan. 13, 1913—May 28, 1938
(*Vice-president*) ..... Jan. 10, 1921—Jan. 9, 1928
(*President*) ..... Jan. 9, 1928—Nov. 19, 1937
de Forest, Robert W. (*Manager*) ..... Jan. 11, 1904—May 6, 1931
Dodge, William E. (*Manager*) ..... Feb. 12, 1895—Aug. 9, 1903
Dolen, Thomas J. (*Manager*) ..... Jan. 11, 1932—Jan. 14, 1935
Edison, Thomas A. (*Manager*) ..... Jan. 13, 1930—Oct. 18, 1931
Field, Marshall (*Manager*) ..... Jan. 8, 1934— Jan. 15, 1947
Frick, Childs (*Manager*) ..... Jan. 14, 1924— Apr. 17, 1950
Guggenheim, Daniel (*Manager*) ..... Jan. 12, 1914—Jan. 14, 1924
Guggenheim, Murry (*Manager*) ..... Jan. 14, 1918—Jan. 9, 1922
Hennessy, Joseph P. (*Manager*) ..... Jan. 9, 1922—Jan. 12, 1931
Hooker, Mrs. Elon Huntington (*Manager*) ..... Jan. 8, 1934—
Howe, Marshall A. (*Assistant Director*) ..... Nov. 22, 1923—Oct. 1, 1935
(*Assistant Secretary*) ..... Jan. 13, 1930—Nov. 15, 1935
(*Director*) ..... Oct. 1, 1935—Dec. 24, 1936
(*Manager*) ..... Nov. 15, 1935—Dec. 24, 1936
(*Secretary*) ..... Nov. 15, 1935—Dec. 24, 1936
Hubbard, Thomas H. (*Manager*) ..... Jan. 9, 1911—May 19, 1915
Jay, Pierre (*Manager*) ..... Sept. 16, 1938— Nov. 29, 1945
Jennings, Allyn R. (*Manager*) ..... Jan. 10, 1938— Feb. 16, 1942
Kane, John I. (*Manager*) ..... May 7, 1895—Feb. 1, 1913
Lee, Frederic S. (*Vice-president*) ..... June 16, 1921—Jan. 8, 1923
(*President*) ..... Jan. 8, 1923—Nov. 17, 1927
Lewis, Clarence McK. (*Manager*) ..... Jan. 13, 1930— [illegible]
Lewisohn, Adolph (*Manager*) ..... June 15, 1916—May 20, 1938
Lockhart, Jr., Henry (*Manager*) ..... Jan 26, 1943 ..... Nov. 21, 1930— [illegible]
MacDougal, D. T. (*Manager*) ..... July 15, 1947 ..... Jan. 8, 1934— [illegible]
Mackenzie, Kenneth K. (*Manager*) ..... Jan. 14, 1924—Oct. 22, 1934
Matheson, W. J (*Manager*) ..... Jan. 9, 1911—Jan. 11, 1926

McAneny, George (*Manager*) ..... Jan. 10, 1916—Jan. 14, 1918
McCollester, Parker (*Manager*) ..... Jan. 21, 1929—Nov. 21,1930
Merrill, E. D. (*Director*) ..... Jan. 1, 1930—Oct. 1, 1935
(*Secretary*) ..... Jan. 13, 1930—Oct. 1, 1935
(*Manager*) ..... Jan. 13, 1930—
Merrill, John L. (*Assistant Treasurer*) ..... Jan. 14, 1918—Oct. 10, 1918
(*Treasurer*) ..... Oct. 10, 1918—Jan. 11, 1937
(*Manager*) ..... Oct. 10, 1918—
(*Vice-president*) ..... Jan. 11, 1932—
Mills, D. O. (*Manager*) ..... Feb. 12, 1895—Jan. 3, 1910
(*President*) ..... Feb. 3, 1898—Jan. 3, 1910
de la Montagne, Henry (*Assistant Treasurer*) ..... Jan. 13, 1919—
(*Manager*) ..... Jan. 14, 1929—
(*Business Manager*) ..... June 2, 1932—
(*Assistant Director*) ..... Oct. 1, 1935—
(*Secretary*) ..... Jan. 11, 1937—
Montgomery, Robert H. (*Manager*) ..... Jan. 14, 1935—
Moore, Barrington (*Manager*) ..... Jan. 9, 1922—July 8, 1929
Morgan, John Pierpont (*Manager*) ..... Feb. 12, 1895—March 31, 1913
(*Treasurer*) ..... March 21, 1895—March 29, 1899
Morgan, J. Pierpont (*Manager*) ..... Jan. 12, 1914—April 21, 1933
Morris, Lewis Rutherfurd (*Manager*) ..... Jan. 12, 1914—Dec. 9, 1936
Neill, Hugh (*Manager*) ..... Jan. 21, 1929—Jan. 13, 1930
Newbold, Frederic R. (*Manager*) ..... Jan. 11, 1915—June 21, 1929
Perkins, George W. (*Manager*) ..... Jan. 14, 1901—June 18, 1920
Porter, H. Hobart (*Manager*) ..... Jan. 11, 1926— July 9, 1947
Rand, Charles F. (*Manager*) ..... Jan. 14, 1924—June 21, 1927
Robbins, William J. (*Director*) ..... Oct. 6, 1937—
(*Manager*) ..... Oct. 6, 1937—
Schiff, Mortimer L. (*Manager*) ..... Jan. 11, 1926—June 4, 1931
Scribner, Mrs. Arthur H. (*Manager*) ..... Jan. 11, 1932—Jan. 8, 1934
Scrymser, James A. (*Manager*) ..... Feb. 12, 1895—April 21, 1918
(*Treasurer*) ..... Jan. 30, 1912—April 21, 1918
Shattuck, Albert R. (*Manager*) ..... Jan. 14, 1924—Nov. 4, 1925
Sloan, Samuel (*Manager*) ..... March 21, 1895—Sept. 24, 1907
Spingarn, J. E. (*Manager*) ..... Jan. 10, 1938— July 26, 1939
Stetson, Francis Lynde (*Manager*) ..... Jan. 13, 1908—Dec. 5, 1920
(*Vice-president*) ..... Jan. 12, 1914—Dec. 5, 1920
Sturgis, F. K. (*Manager*) ..... Jan. 12, 1920—June 15, 1932
(*Vice-president*) ..... Jan. 8, 1923—Jan. 11, 1932
Swan, Joseph R. (*Manager*) ..... Jan. 8, 1934—
(*Treasurer*) ..... Jan. 11, 1937—Jan. 10, 1938
(*President*) ..... Nov. 19, 1937—
Thompson, William Boyce (*Manager*) ..... Jan. 10, 1921—Jan. 9, 1928
Thompson, W. Gilman (*Manager*) ..... Jan. 9, 1899—Dec. 1926
(*President*) ..... Nov. 10, 1913—Jan. 8, 1923
Thorne, Robert (*Manager*) ..... Jan. 21, 1929—Jan. 13, 1930
Thorne, Samuel (*Manager*) ..... Jan. 8, 1900—Jan. 10, 1910
Tierney, Myles (*Manager*) ..... Jan. 9, 1911—Jan. 13, 1921
Tiffany, Louis C. (*Manager*) ..... Jan. 12, 1914—Jan. 13, 1919
Torrey, Raymond H. (*Manager*) ..... Jan. 14, 1935—July 15, 1938
Vanderbilt, Cornelius (*Manager*) ..... Feb. 12, 1895—Sept. 12, 1899
(*President*) ..... March 21, 1895—Feb. 3, 1898
Webster, William H. (*Manager*) ..... Jan. 12, 1931—Jan. 8, 1934

THE NEW YORK BOTANICAL GARDEN
EX-OFFICIO MANAGERS

Berolzheimer, Philip (*The President of the Department of Public Parks*) .....Nov. 1918—Jan. 1919, incl.
Clausen, Geo. C. (*The President of the Department of Public Parks*) 1898—1901, incl.
Cruger, S. V. R. (*The President of the Department of Public Parks*) 1896
Gallatin, Francis Dawson (*The President of the Department of Public Parks*) .....Feb. 1919 -May 1926, incl.
Gaynor, William J. (*The Mayor of the City of New York*) ..Jan. 1910—Sept. 1913, incl.
Grell, William F. (*The President of the Department of Public Parks*) .....Jan. 1918—Oct. 1918, incl.
Herrick, Walter R. (*President of the Department of Public Parks*) .....June 1927—April 1933, incl.
Herrman, Moses (*The President of the Department of Public Parks*) .....Feb. 1906—Sept. 1906, incl.
Hylan, John F. (*The Mayor of the City of New York*) .....Jan. 1918—Dec. 1925, incl.
Kline, Adolph L. (*The Mayor of the City of New York*) ....Oct. 1913—Dec. 1913, incl.
LaGuardia, Fiorello H. (*Mayor of the City of New York*) .....Jan. 1934— Dec 1945
La Roche, Louis F. (*The President of the Department of Public Parks*) .....Dec. 1913—Dec. 1913
Low, Seth (*The Mayor of the City of New York*) .....Jan. 1902—Dec. 1903
MacMillan, Samuel (*The President of the Department of Public Parks*) ...1897—1898
Marshall, James (*President of the Board of Education*) .....May 9, 1938— May 12, 1942
McClellan, George B. (*Mayor of the City of New York*) ....Jan. 1904—Dec. 1909, incl.
McKee, Joseph V. (*Acting Mayor of the City of New York*) .....Sept. 1932—Dec. 1932, incl.
Mitchell, John Purroy (*Mayor of the City of New York*) ...Jan. 1914—Dec. 1917, incl.
Moses, Robert (*Park Commissioner*) .....Jan. 1934—
O'Brien, John P. (*Mayor of the City of New York*) .....Jan. 1933—Dec. 1933, incl.
Pallas, John J. (*The President of the Department of Public Parks*) .....Jan. 1904—Jan. 1906, incl.
Ryan, George J. (*President of Board of Education*) .....April 29, 1933—May 13, 1936
Sheehy, John E. (*President of the Department of Public Parks*) .....May 1933—Dec. 1933, incl.
Smith, Henry (*The President of the Department of Public Parks*) .....Dec. 1907—Dec. 1909, incl.
Stover, Charles B. (*The President of the Department of Public Parks*) .....Jan. 1910—Nov. 1913, incl.
Strong, William L. (*Mayor of the City of New York*) .....1896—1897, incl.
Turner, Henry C. (*President of the Board of Education*) ....May 13, 1936—May 1938
Van Wyck, R. A. (*Mayor of the City of New York*) .....1898—1901, incl.
Volentine, Robert F. (*The President of the Department of Public Parks*) .....Nov. 1917—Dec. 1917, incl.
Walker, James J. (*The Mayor of the City of New York*) ...Jan. 1926—Aug. 1932, incl.
Ward, George Cabot (*The President of the Department of Public Parks*) .....Jan. 1914—Oct. 1917, incl.
Wilcox, William R. (*The President of the Department of Public Parks*) .....Jan. 1902—Dec. 1903, incl.

APPOINTIVE MANAGERS

Blakeslee, A. F.....April 29, 1933—Oct. 1934
Bogert, Marston T.....April 29, 1933 -
Harper, R. A.....April 29, 1933— Nov. 24, 1942
Hazen, Tracy E.....Nov. 1934— Jan 17, 1940
Sinnott, Edmund W. *.....April 29, 1933— Oct. 3, 1940
Trelease, Sam F.....April 29, 1933—

* an elected manager

THE NEW YORK BOTANICAL GARDEN
SCIENTIFIC DIRECTORS

(Since 1933 the duties of the Scientific Directors have been taken over by the Board of Managers.)

Bacon, Raymond F.....Jan. 1931—April 29, 1933
Berkey, Charles P.....Feb. 1918—Oct. 1919, incl.
Nov. 1926—April 29, 1933
Bicknell, Eugene P.....June 1913—Dec. 1922, incl.
Blakeslee, A. F.....Jan. 1933—April 29, 1933
Bogert, Marston T.....Nov. 1928—April 29, 1933
Britton, N. L.....March 13, 1894—June 9, 1896
Brown, Addison.....March 13, 1894—Dec. 1904, incl.
Burgess, Edward S.....Jan. 1912—Dec. 1913, incl.
Burlingham, Charles C.....March 1902—Jan. 1903, incl.
Butler, Nicholas Murray.....Feb. 1902 April 29, 1933
Chandler, C. F.....March 13, 1894—June 1911, incl.
Churchill, Thomas W.....March 1913—Jan. 1916, incl.
Cox, Charles F.....April 28, 1903—Jan. 24, 1912
Denslow, H. M.....June 1928—Dec. 1929, incl.
Gies, William J.....July 1911—Oct. 1928, incl.
Harper, R. A.....July 1911—April 29, 1933
Hubbell, Charles Bulkley.....1897
Kemp, James F.....March 13, 1894—Nov. 17, 1926
Lee, Frederic S.....April 28, 1903—Nov. 17, 1927
Little, J. J.....1898—May 1900, incl.
Low, Seth.....March 13, 1894—Oct. 1901, incl.
Maclay, Robert.....1895—1896
MacDougal, D. T.....July 8, 1929—April 29, 1933
Moore, Barrington.....July 8, 1929—Jan. 12, 1931
O'Brien, Miles.....June 1900—Feb. 1902, incl.
Prall, Anning S.....Nov. 1919—March 1922, incl.
Richards, Herbert M.....Feb. 1917—Jan. 9, 1928
Rogers, Henry A.....Feb. 1903—Oct. 1904
Rusby, H. H.....April 9, 1900—April 29, 1933
Ryan, George J.....April 1922—April 29, 1933
Sinnott, Edmund W.....Jan. 1930—Dec. 1932, incl.
Somers, Arthur S.....Feb. 1918—Oct. 1919, incl.
Thompson, W. Gilman.....March 13, 1894—Dec. 20, 1898
Tifft, Henry N.....Dec. 1904—Jan. 1906, incl.
Trelease, Sam F.....Oct. 1930—April 29, 1933
Underwood. Lucien M.....Oct. 8, 1896—Nov. 16, 1907
Willcox, William G.....Feb. 1916—Jan. 1918, incl.
Winthrop, Jr., Egerton L.....Feb. 1906—Feb. 1913, incl.

Azaleas and primulas played an important part throughout many weeks in the floral displays in the main conservatories.

NEW YORK BOTANICAL GARDEN MEMBERSHIP

BENEFACTORS

*Edward D. Adams
*Mrs. Fanny Bridgham
*N. L. Britton
*Addison Brown
*Andrew Carnegie
Columbia University
*Charles P. Daly
*James B. Ford
*Daniel Guggenheim
Murry Guggenheim
Edward S. Harkness
*Mrs. John Innes Kane
*D. O. Mills
*J. Pierpont Morgan, Sr.
J. P. Morgan
*John D. Rockefeller
John D. Rockefeller, Jr.
*Mrs. Russell Sage
*Francis Lynde Stetson
*Cornelius Vanderbilt

PATRONS

Oakes Ames
Alexander P. Anderson
*Mrs. Alexander P. Anderson
Arnold Constable & Co.
*George F. Baker
*Samuel R. Betts
*Catharine A. Bliss
*Emil C. Bondy
*Mrs. George Whitfield Collard
*Mrs. Louisa Combe
*James M. Constable
Mrs. W. Bayard Cutting
*Charles Deering
*Henry W. de Forest
*Robert W. de Forest
*Mary A. Dill
*William E. Dodge
*Josiah M. Fiske
*William B. Ford
Childs Frick
*George J. Gould
*Mrs. Esther Hermann
*Frederick Trevor Hill
Archer M. Huntington
*Henry Iden
*Mrs. Helen C. Inslee
*John S. Kennedy
*Mrs. Mary J. Kingsland
Frederic S. Lee
*Mrs. Frederic S. Lee
*Lewis R. Morris
*Oswald Ottendorfer
*Lowell M. Palmer
*William Rockefeller
*William R. Sands
*William C. Schermerhorn
*Mortimer L. Schiff
*James A. Scrymser
*Mrs. James A. Scrymser
*Mrs. Finley J. Shepard
*Samuel Sloan
*F. K. Sturgis
*Mrs. Frederic F. Thompson
*W. Gilman Thompson
*W. K. Vanderbilt
*Mrs. Antoinette Eno Wood

FELLOWS FOR LIFE

J. E. Aldred
*John D. Archbold
*H. O. Armour
*George N Best
Elizabeth Billings
*George S. Bowdoin
*Mrs. N. L. Britton
Mrs. Andrew Carnegie
*James W. Cromwell
Mrs. George B. deLong
*Cleveland H. Dodge
*Mrs. Melissa P. Dodge
*H. C. Fahnestock
S. R. Guggenheim
William Halls, Jr.
*Mrs. Stephen Harkness
Mrs. William L. Harkness
*Thomas H. Hubbard
*Mrs. Robert Hunter
*C. P. Huntington
*David B. Ivison
*Mrs. D. Willis James
*Morris K. Jesup
*Mrs. Morris K. Jesup
*John Innes Kane
*Mrs. John Stewart Kennedy
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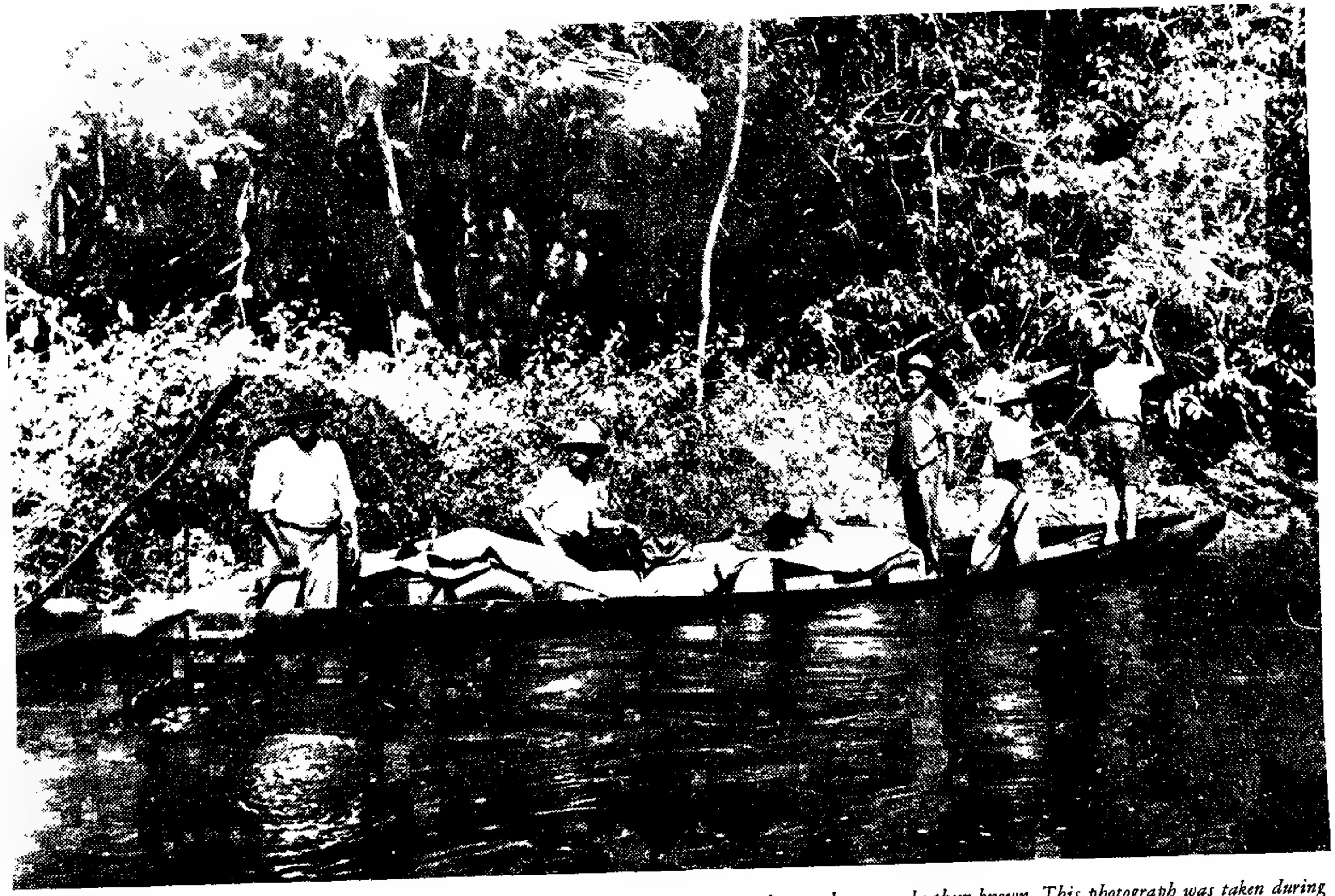

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R. Stuyvesant Pierrepont
Seth L. Pierrepont
Mrs. Cornelia Bryce Pinchot
Mrs. J. O. H. Pitney
Mrs. Herman G. Place
Frank L Polk
Mrs. Arthur Poillon
Howard A. Poillon
Mrs. Maurice Pollak
Mrs. William C. Popper
Abram S. Post
Blanche Potter
Mrs R. Burnside Potter

Mrs. George D. Pratt
Mrs. Clarence Price
Mrs. E. F. Price
Mrs. Julius Prince
Princeton Garden Club
Mrs. Robert C. Pruyn
Mrs. Henry St. Clair Putnam
Mrs. Percy R. Pyne

Mrs. Richard Quaintance

Mrs. L. M. Rabinowitz
Mrs F. F. Randolph
Robert C. Ream
Mrs. Ogden Mills Reid
Samuel W. Reyburn
Harold C. Richard
Oscar L. Richard
Anne S. Richardson
Mrs. Charles A. Riegelman
Jane Righter
F. Bayard Rives
George Roberts
Beverley R. Robinson
Mrs. John D. Rockefeller 3d.
Mrs. Nelson A Rockefeller
Louis P. Rocker
Hubert E. Rogers
Mrs. Rainey Rogers
Mrs. Caroline Rosenbaum
Rosalie Rosenberg
E. E. Rossmoore
Albert Rothbart
Rose Rudeck
Eugene F. Russell
Marie L Russell
Martha M. Russell
Mrs. William F. Russell

Georgina W. Sargent
Herbert L. Satterlee
Mrs. Herbert L. Satterlee
Mrs. Thomas E. Satterthwaite
Mrs. J. Louis Schaefer
Anton Schefer
Robert Schey
William Schiff
Kenneth B. Schley
Max Schling, Inc.
Mrs. C. Albert Schwab
Mrs Anthony Schulte
Mrs. Joseph M. Schulte
Richard Schuster
C. M. Schwab
Emily Schwab
Mrs. Henry F. Schwarz
Antoinette Q. Scudder
Edward M. Scudder
Mrs. Townsend Scudder
Hewlett Scudder

The holiday season was heralded with an unusual display of hundreds of flowering plants set out in gardenesque manner in the main conservatories (Range 1).

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Mrs. K. Seifert
Mrs. George H. Semken
Mrs. Alfred Seton
Frederick H. Shaw
Mrs. David Shea
Mrs. Ellen Shipman
Edgar N. Sidman
Mrs. Reinhard Siedenburg
Mrs. Zalman G. Simmons
Mrs. Robert E. Simon
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Mrs. L. T. Sloan
Mrs. Samuel Sloan
Samuel Sloan
Miss C. Slochower
Daniel Cranford Smith
J. A. B. Smith
Frederick Snare
Mrs. Elmer J. Snow
Phineas Sondheim
Ethel D. Spears
Mrs. Edward W. Sparrow
Mrs. Gino C. Speranza
William A. Sperling
J. E. Spingarn
A. T. Stanley
Charles A. Stanwick
Howard W. Starr
Mrs. J. R. Steers
Mrs. Sigmund Stein
Louis Steinam
Roderick Stephens
Mrs. Robert D. Sterling
Mrs. Edna Phillips Stern
Mrs. E. R. Stettinius
Rev. William J. Stewart
William R. Stewart, Jr.
Mrs. George J. Stier
Robert G. Stone
Harry H. Straus
Nathan Straus
Roger W. Straus
Samuel Strauss
Ethel G. Stringfellow
John R. Strong
Mrs. Theron G. Strong
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Mrs. David Stuart
Mrs. Walter Stunzi
Frederick Sturges, Jr.
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Victor C. Thorne
Nathaniel Thurlow
Sherman Thursby
Louis L. Tieman
Mrs. Henry M. Tilford
Louis B. Tim
Mrs. Elizabeth Drew Tomlinson
Roy E. Tomlinson
Emily Topp
John H. Towne
Mrs. John B Trevor
Charles Triller
E. Kellogg Trowbridge
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Mrs. Harold McL. Turner
Harrison Tweed

Samuel Untermyer

Christine R. Vail
Martha C. Vail
Marguerite E. Valentine
Mrs. J. H. Van Alstyne
Jeremiah R. Van Brunt
Augustus Van Cortlandt
Mrs Augustus Van Cortlandt
W. T. Vanderlipp
Mrs. Stephen G. Van Hoesen
Louise Van Ingen
Philip Van Ingen
Mrs. Edwin Van Riper
George Van Santvoord
Gertrude A. Venner
William Von Phul

Mrs. W Austin Wadsworth
Stuart Walker
Mrs. W. K. Wallbridge
Mrs. Robert Waller
Leo Wallerstein
William I. Walter
Mrs. Felix M. Warburg
Wilbur Ward
Mrs. Donald J. Warner
G. C. Watson
Mrs. Thomas J. Watson
Mrs Samuel H. Watts
Robert Wayman
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George H. Weber
Jules Weber
Orlando F. Weber
Mrs. Orlando F. Weber
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Mrs. Harrison Williams
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Mrs. Nelson B. Williams
Mrs. Percy H. Williams
Mrs. Alfred Willstatter
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Orme Wilson, Jr.
Mrs Morgan Wing, Jr.
Bronson Winthrop
Grenville L. Winthrop
John C Wister
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Worcester County Horticultural Society
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August Zinsser
Mrs. Frida Zinsser
Mrs. A. A Zucker

THE STAFF OF THE NEW YORK BOTANICAL GARDEN

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H. A. GLEASON, PH. D. ..... *Assistant Director and Head Curator*
HENRY DE LA MONTAGNE ..... *Assistant Director*
A. B. STOUT, PH. D. ..... *Curator of Education and Laboratories*
FRED J. SEAVER, PH. D., SC. D. ..... *Curator*
BERNARD O. DODGE, PH. D. ..... *Plant Pathologist*
JOHN HENDLEY BARNHART, A. M., M. D. ..... *Bibliographer*
ALBERT C. SMITH, PH. D. ..... *Associate Curator*
HAROLD N. MOLDENKE, PH. D. ..... *Associate Curator*
ELIZABETH C. HALL, A. B., B. S. ..... *Librarian*
H. H. RUSBY, M. D. ..... *Honorary Curator of the Economic Collections*
FLEDA GRIFFITH ..... *Artist and Photographer*
PERCY WILSON ..... *Research Associate*
ROBERT S. WILLIAMS ..... *Research Associate in Bryology*
E. J. ALEXANDER ..... *Assistant Curator and Curator of the Local Herbarium*
W. H. CAMP, PH. D. ..... *Assistant Curator*
CLYDE CHANDLER, A. M. ..... *Technical Assistant*
ROSALIE WEIKERT ..... *Technical Assistant*
FREDERICK KAVANAGH, M. A. ..... *Technical Assistant*
CAROL H. WOODWARD, A. B. ..... *Editorial Assistant*
THOMAS H. EVERETT, N. D. HORT. ..... *Horticulturist*
G. L. WITTROCK, A. M. ..... *Docent*
OTTO DEGENER, M. S. ..... *Collaborator in Hawaiian Botany*
ROBERT HAGELSTEIN ..... *Honorary Curator of Myxomycetes*
ETHEL ANSON S. PECKHAM ..... *Honorary Curator, Iris and Narcissus Collections*
ARTHUR J. CORBETT ..... *Superintendent of Buildings and Grounds*
A. C. PFANDER ..... *Assistant Superintendent*

OUR BOTANICAL GARDEN

(From The New York Times, Monday, January 23, 1939.)

THE average New Yorker, or even those brought up on "Swiss Family Robinson" or "Robinson Crusoe," would not expect to find the bread-fruit tree and coco palms growing in this city. Yet here they are and doing very well, together with the banyan, the agave, the papyrus and rare Himalayan orchids. These and thousands more are flourishing in the New York Botanical Garden, where all who care to may walk amid tropical luxuriance or pause among specimens of fossil forests long vanished from the earth.

Fifty years ago this month [January] the first appeal for funds to open a "public botanic garden" was issued by citizens here who had admired the Royal Botanic Gardens at Kew. Ten years later the Museum Building was occupied. The institution has been growing ever since. The herbarium, which numbers 1,933,506 plant specimens, is now one of the outstanding collections in the world. The beautiful floral displays, among them the Thompson Memorial Rock Garden, which alone contains 2,500 different kinds of flowering plants, is an inspiration to amateur gardeners. The scientific research and classification by members of the staff, done in collaboration with similar institutions in all civilized countries, is important work which must not be checked.

Our Botanical Garden prospered on early endowments. But these have dwindled, and the ever-widening activity of the institution in new service to the public, despite rigid economy in administration, requires additional donations. *Surely there are nature-loving souls today as generous as those who made the Botanical Garden possible a half-century ago.*

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